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A Record of the Progress of Pharmacy and the Allied Sciences

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THE AMERICAN
JOURNAL OF PHARMACY

VOL. 103 JULY, 1931 NO. 7

EDITORIAL

BUGS

SOME TIME ago the editor published in this journal (1926) a brief article, captioned as above and calling attention to the reckless broadcasting over the land of toxic insecticides in man's great battle against the overwhelming hordes of bug battalions.

Since that day certain parts of Pennsylvania and New Jersey have been invaded by a particularly pernicious pest in the person of a hungry beetle known thereabouts as the Japanese beetle—a voracious pest, whose coefficient of multiplication is about on a par with its appetite for greenery—and which has wrought unbelievable havoc wherever its flight has carried it. Government experts have worked diligently to prevent the spread of the scourge and some success has been achieved. Parasitic enemies have been imported to check the beetle's forward march—*thousands of tons* of arsenate of lead, a vicious poison, have been scattered over flower and vegetable, fruit and foliage, grass and every greenery. Beetle bait and beetle traps add a queer though somewhat effective novelty to vegetable and flower gardens—and the careful neighbor thus invites into his own precincts the marauding bug from the garden of a less careful neighbor who cares not a hang for bug or bait. And so it goes—and so do the bugs go—marching on. What prompted this writing, however, is the fact that no one except a few well meaning persons interested in the conservation of wild bird life seems to pay much attention to the recklesss spraying of this poison—a few ounces of which is sufficient to poison a whole community—and to do so with sublety and despatch.

Philadelphia papers the other day carried the story of four children, one killed, the others made seriously ill through eating cherries picked from a tree so sprayed!!

And little wonder—for a grain or two of this toxic material is sufficient to kill a youngster!!

But to return to our 1926 article. Here it is:

"Entomologically the word 'Bugs' refers to any insect of the sub-order Heteroptera. Etymologically it has a diversity of meanings. In the middle English and the Welsh, variants of it meant the goblin and the bogey-man. Later, it came to mean an insect of any sort, irrespective of zoologic classification. Still later, in the reckless mill of American slang it has acquired a brand new character. Thus one who specializes in any field becomes a 'Bug'—one who shows enthusiasm over pursuit or hobby or pastime is likewise labelled. There also is a most striking application of the word in our slang, when its pronouncement marks the dismissal of a subject with the most profound and final contempt.

"Thus to the man in the street, the venerable member of the Fifth Estate, shortening his span of life seeking solution of the cross-word puzzle of God and the Universe, is a 'Bug' and all who dabble in science are 'Bugs.'

"To the slang-maker, who accepts his all, as dumbly 'as a fish accepts the ocean'—every altruistic notion, every fine emotion—meets with the same grandiloquent comment—'Bugs!'

"But we did not mean to elaborate so on the etymology of the word except perhaps that its zoologic and its slang interpretation both apply to the following context.

"Enthusiasm is as dangerous as it is necessary. It affects vision, and its progenitors, though perchance developing a most acute sense for distance actually become blind to the near and the obvious.

"And truly it is fatal to lift the eyes to far horizons if in the meantime we omit to note the pitfalls and the inclines and the quicksands on the trail.

"A Government publication on poisonous insecticides and fungicides inspired the foregoing remarks.

"For certainly, in man's battle against the invading hordes of insects that come to devour his crops and his cattle-fodder, the enthusiasm of those who direct the plan of warfare, has somewhat dimmed the effectiveness of their tactics.

"For just as the winds of the western front blew back to the German lines the venomous vapors they released to decimate the Allied ranks on that fateful day in history—so will the reckless poisons broadcast by the 'Bug' experts of State and Federal governments 'blow back' to kill, not the beetle and caterpillar hosts, but the very humans whose existence they seek to protect.

"Indeed, it is already happening—for with arsenic in our apples* and our beans—and copper and arsenic in celery and salad and cabbage—and with the soil of our potato patches saturated with the vicious Paris green, enough of these atrocious poisons are used each season to constitute a serious menace to the welfare of the race.

"Read the following announcement of a new insecticide and fungicide, which comes well recommended and agree with the writer that the indiscriminate recommendation of such a compound, without extensive study as to its ultimate disposal in the plant, well qualifies the slang application of the term 'Bug' to the one who proposes its widespread use:

" 'Consternation among the bug pests of Southern California is expected to follow the introduction of calcium cyanide, a new death-dealer which appears to be the most powerful agricultural poison yet known.

" 'Recent field tests show that calcium cyanide is much more potent than pure hydrocyanic acid, or prussic acid, heretofore considered the ultimate 100 per cent. of toxic power. This unexpected result so far is not explained. After one test of calcium cyanide this winter in an orange grove, where a very resistant strain of scale insects was infesting the foliage, only two bugs were found alive among over 3000 insects actually counted. This record is especially encouraging to growers who have found the scale pests gradually developing immunity to regular doses of hydrocyanic acid. As one orchardist suggests—"the ancestors of the scale have been killed so often that their progeny don't mind it any more."

" 'Calcium cyanide, while theoretically appearing to be a simple preparation to the ordinary chemist, is impossible to make in any ordinary way. By combining calcium carbide with hydrocyanic acid, however, a light brown powder is secured, and this substance has the remarkable power of pouring out a veritable wave of poison gas when it is merely exposed to common air. Fumigators simply blow the poison in a dust cloud under the regular orchard tent; and whatever animal was living under the tent dies, regardless of whether it be a scale insect, a luckless owl or an itinerant rooster.'

"We might add that whatever animal, including the human, was living within a range of a mile of the fumigated region would suffer some from the cyaniding. And imagine placing so

*New Jersey boasts of two apple-shampooing stations where a mild alkaline treatment *removes* the arsenic!!

potent an instrument in the hands of the average 'orchardist,' then ask the question, 'What becomes of the cyanide?'

"And what becomes of the millions of pounds of arsenic annually imported into America for insect destruction?

"Why is it that the druggist almost makes a ceremony out of a sale of cyanide, while it and other potent poisons may be purchased *ad libitum* from a dealer in garden supplies?

"Truly, so important a matter of public health calls for sane consideration which it is apparently not receiving at the hands of the enthusiasts responsible for compiling these special bulletins of State and Federal departments."

IVOR GRIFFITH.

ORIGINAL ARTICLES

WHAT FUR?*

By Ivor Griffith, P. D., Ph. M.

Assistant Professor of Pharmacy, Philadelphia College of Pharmacy and Science: Professor of Organic Chemistry, Wagner Free Institute of Science; Director of Research, John B. Stetson Company, Philadelphia.

MAN is the biologic center of universe. He has accepted it as a foregone conclusion that everything in and upon earth has been placed there for his special benefit. Green things that grow in fields and forest—and animals that long for, or belong to the wilderness—all these living creatures, he observes, are the offerings of a beneficent Intelligence—dedicated to his service during a brief sojourn upon the planet. They furnish his food—tackle his tasks—grant him his garments—and frequently fashion his fun—in short, from grain of wheat to lumbering mastodon, they are his obedient, versatile servants, accepting their servility quite as nonchalantly as their master assumes his superiority.

Ivor Griffith

Time, was, however, so one school of scientific thought informs us, when man was not so lofty-minded, nor occupied so select a place in the zoologic Who's Who? Then he too, was but a hairy beast, a wiry traveler on tree tops, with mad grunts and glad grunts his only items of speech and expression.

IN THE TREE TOPS

His food was what he found afield—berries and bulbs and tubers—rarely he tasted the swill of the kill. Clothes gave him not a whit of concern, for his fur, fixed to the season, furnished the needed warmth. Tonsorially and sartorially nature took care of his varied wants. When glacial winds were whistling through the tree tops, crisping the conifer tips, his shaggy overwhelming fur, matted with grime and grease, kept him in blood-warm comfort. And when spring and crocuses came, and the tree ferns turned to green again, he shed his winter

*One of a Series of Popular Science Lectures, delivered at the Philadelphia College of Pharmacy and Science, 1931 Season.

garment, moulted, as it were, and in his flimsier summer fur filled the forest with his frantic antics.

But we must not believe that this, our hypothetical granddaddy led an unperturbed existence. No indeed—for the rule of the jungle, then as now, favored the fit to survive.

Huge lumbering creatures, whose protoplasmic masses must have taken aeons to accumulate and organize, ploughed through the bubbling mud and slime of an earth in labor. Towering mastodons, garrisoned with an armor plate as tough as steel, scattered terror over bog and fen.

But sometime it came to pass, through a smart trick of destiny, or perhaps through Godly plan, that the hairy creature descended from the treetops, and sought the sheltered cave. Within a million years or so this little mammal of the cave had come to know his power.

Title page from Heures a l'usage de Rome (Philippe Pigouchet), Paris, 1496—showing the ancient artist's conception of early man and woman in their primitive coats of fur.

FROM THE HILLS OF CHAOS

To him at some time or another, was g i v e n the germ of conscious thought—a weapon against which it was futile for the kingdom of animal to fight. Mammoth and mastodon passed out of the picture, and over the hills of chaos dawned this thinking creature called Man.

Gone was his fear of the open—his sheltering cave deserted. Weapons he fashioned from flint and bone, and in their security he challenged, hunted and killed his less fortunate animal kind. T h e i r blood he drank—their flesh he ate, their skins and fur he adopted and adapted for his own cover and comfort. Latterly the shaggy coat of fur and hair which totally covered his body in treetop days, had permanently left him, except in isolated spots.

Just how this wholesale shedding occured has never been explained with satisfaction, although our scientist friends attribute this spotty alopecia to such changes in diet and habits that came to man when first he acquired reason.

In any event the question which captions the lecture this evening must have been asked for the first time, though not in the same words, of that primitive hunting progenitor of ours. Returning from the chase on an autumn eve, he is met on the cavern threshold by his shivering, whining mate of a wife, not with the question "What luck?"—but with the much mooter—much more practical question "What Fur?" For she was wise enough to know that a find of fur was a fund of food as well. No wonder she asked "What Fur?"

And to this very day the burning question perorates. We have traveled far from the primitive cave, and our hunting is largely for golf balls, yet with each returning Fall, "What Fur" becomes the question.

Some may respond with leopard,
  And some with kangaroo,
Others with sable satisfy,
  And some folks simply gnu.
But leopard, gnu and kangaroo,
  Sable and seal and rat,
May only be bunny on masquerade,
  And sometimes worse than that!

Nor do we have to accept the word of the evolutionist for man's ancient predilection towards the clothes of his animal kin. For in the oldest and finest history book of all time—the Bible—whose accuracy is so frequently attested to by archeologists at present grave robbing with sanction in Biblical lands—in this ancient record we find an early reference to fashions in fur.

When Eve had eaten Adam out of house and home, and so made the apple a symbol of lasting employment, new concepts of dress resulted. Outside the garden wall—the mother of men turned tailor and seamstress too. For the primal sin had made the pair conscious of new sensations—not the least significant of which was a dress consciousness.

Adam, breathless, scurried over garden wall and plucked a leafy fig branch. Whereupon Eve, with a stitching versatility and skill no longer expected of her daughters, "sewed fig leaves together and made themselves aprons." Such was the first adventure in custom tailoring.

THE FIRST FURRIER

Yet so perishable was this primitive one-piece suit—and so scant in warmth and comfort, that when winter came to Eden suburbs, and the nipping frosts of Palestine drove the shivering sinners to some sunless subterranean cave, the compassion of Him "whose mercy is over all His works" is thus recorded in early Genesis—"Unto Adam also and to his wife did the Lord God make coats of skins and clothed them."

So did Adam and Eve discard their vegetarian outfit and turn to fur for comfort. And what a joy it must have been to Eve, and a greater joy for Adam, to know that on the primal promenade Eve had no competitor. Her fur coat was *the* coat—no other style, or fit, or fashion could possibly transcend hers—for she had the first and only choice of outfits.

Yet it may have been that Eve's pert answer to our query "What Fur"—was simply *"Fur* comfort's sake!!" Comfort—not style was the early incentive. The feminine desire to revel in luxurious raiment came long after Eve. Competition within the species with the Joneses, the Smiths and the Cohens, and outside the species with blossoms and butterflies and colorful birds on the wing, was a development of the centuries in Eve's erratic daughters. Comtemptuous of comfort, and with a queer catering to seasonal changes, they sport their furs midsummerly and hide them with camphor when the blizzard howls.

FOR FUR'S SAKE

To meet their needs and whet their whims the animal world has suffered much. Species have been extinguished and such as still exist are mostly children of the night, rarely venturing in the open by day for fear of the two-legged nuisance. For fur's sake ruthless wars have had their sway. Adventure and conquest, exploration and colonization, treks by land and hazardous trips over uncharted seas have all had their ample recompense in a find of furry treasure.

Its siren voice has lured men from the comfort of their fireside into the feverish bogland of early Louisiana clear to the flesh freezing whiteness of the Arctic night, and far up the barren Andes, to gamble away their very lives for rare coats of fur for fashion's foolish fancies.

It may seem a silly pun to suggest that it was the beaver, busy little beaver, that colonized young America. Yet it is very true that

it was his precious pelt that paid the greater part of the expense of colonizing this land.

Beaver pelt was coin of the realm in our pioneer days. Madam went to market with a carload of skins, and returned with their equivalent in merchandise. For a kitchen pot—one beaver skin—for a looking-glass a dozen; for a quart of rye—a muskrat pelt; for a London hat—six beavers. Such are the entries in an old Hudson's Bay Company's journal.

THE SKIN GAME

Indeed there are sections of our country today where the finely furred skin of the raccoon is still the small coin of the locality. In the back hills of Kentucky moonshine moisture is often paid for with pelts of possum or raccoon, and in pre-prohibition days saloons in the South were often the clearing houses of the local fur trade. In the State of Franklin, a part of Tennessee which once seceded, the pay of the state officials was altogether in fur pelts.

This was the salary schedule (January 1st, 1790):

Governor.....1000 deer skins per annum
State Treasurer.....450 raccoon skins per annum
Justices.....one muskrat skin for each warrant signed
Constables.....one mink for every warrant served, etc.
Others according to rank.

Politics, in spite of a changed manner of emolument, is still something of a skin game.

Fur Sources.

In the animal kingdom only those referred to as mammals are upholstered with useful fur, and since the dominion of such creatures is world wide, fur is harvested from every corner of earth.

As is noted elsewhere, the garnering and the preparing of these furs for their diversified uses is probably the world's oldest industry, and an industry which has never had a period of real *re*pression. Down the trail of centuries we can follow the story of fur. Greeks and Romans, Chinese, Phoenicians and Babylonians were expert in collecting and preserving skins and furs of all descriptions.

Queen Semiramis of Babylon, at the close of her invasion of India, is said to have brought back with her 8000 skins of tiger. Armenia, an important fur trading center of Biblical times, gave its name to Ermine, that furry sign of royalty. Spain, too, received its original name from Spaniga (the land of rabbits) on account of the tremendous number of these little creatures which were once a pest in the land. Arctic and Antarctic natives, God's frozen people, have always been upholstered in fur. There are no vegetarians, internal or external in those regions where every hour is a zero hour.

A few odd findings which came to light while tracing the early story of fur are disconnectedly given here, just by way of a breathing spell.

In Norman England, prior to the Battle of Hastings (1066 A. D.), homespun had come to be very fashionable. It was new and scarce by reason of which it was worn almost exclusively by the nobility when not dressed in their fighting clothes of scrap iron and boiler plate. The poor peasants and college professors however, wore furs of various descriptions, possibly the only time in recent history when fur garments were cheaper than common textiles.

CINDERELLA'S SLIPPER OF FUR

Did you know that Cinderella's lovely slipper was never glass at all?

Well, it happened this way. Perrault, a noted French author, stole a fairy story from the Egyptians, and under the title "Cindrillion" revamped it in French. Although the original manuscript had it that Cinderella dropped on the front porch of the prince's palace a *pantoufle en vair* (a slipper of *fur*) a sleepy printer set the type so as to read *en verre,* which means *glass.* And Perrault, having been prepaid for his story, never read proof. Thus Cinderella's slipper has been lied about for generations, for it was not glass at all, but fur. Of course the rest of the story is true.

THE HUDSON'S BAY COMPANY

But the most romantic story of the fur industry is probably that which is written into the annals of early American history. Records of Prince Rupert and his cosmopolitan Hudson's Bay Company, and of other fur gathering institutions read like fiction, particularly with regard to the dividends paid. The part which they played in opening the frontiers

of young America, and in developing the resources of a new continent was an important one.

"Gentlemen Adventurers of the Ancient and Honorable Hudson's Bay Company, who could build forts and send out ships of war, and who could declare war and make peace with any non-Christian country." That was in 1607, and the same Company still operates today. Their sense of geography was splendidly broad, for to them the Hudson's Bay once extended as far west as California, and from the ceiling of the United States clear to the crown of the North Pole, an actual territory some five million square miles in extent.

from old Lampson Catalog.

PUBLIC SALE,

London Commercial Sale Rooms, Mincing Lane,

Wednesday, Thursday, Friday & Monday

AUGUST 25th, 26th, 27th & 30th, 1858,

THE FOLLOWING GOODS, viz.—

227,809	Raccoon	1	5749	Martin	25
28,317	Fox Red	10	34,989	Mink	45
640	" Cross	20	228,134	Musquash	46
123	" Silver	30	94,533	" Black	
2740	Otter	47	1283	Lynx	60
129	" Sea	50	3777	Cat Common	75
2204	Fisher	55	14,364	Fox Grey	75
2939	Bear	60	13,843	" Kit	75
2937	Beaver	65	5313	Skunk	75
696	Wolf	75	6905	Opossum	75

And SUNDRY FURS - - Page 77

The increased demand for fur and the added costs of trapping and marketing, have naturally sent prices skyward. So that a comparison of prices may be made there is printed herewith a page from an old Lampson catalogue of 1858, showing the number of skins offered for sale and the prices secured therefor, in addition to present top prices for the same material.

FUR FARMING

Trapping in various parts of the world is still tremendously productive, although natural sources have been much depleted, in spite of legal artifices to curb such depletion, and to encourage productivity. To offset this, fur farming has been successfully inaugurated.

In Canada during the past ten years the three major furs were trapped in the following numbers:

Muskrat	over 20 million
White weasel (American ermine)	" 3 "
Beaver	" 1½ "

During the same period Louisiana alone furnished a larger number of muskrats, most of which in recent years came from muskrat

"plantations." The United States, by the way, is by far the leading nation in fur production, and promises to continue so for some time to come, particularly since the new farming ventures are doing so well.

BURBANKING BUNNIES

By Burbanking foxes, the expensive silver fox, once considered a freak, is now turned out on a quantity basis. Raccoon, skunk, beaver, nutria, muskrat and caracul are also farm products. By selective breeding even the lowly bunny takes on a new significance, for experts in bunny biology can turn them out in any color. This, by the way, is not, as recently heralded, a brand-new discovery, for as early as 1691 the Trappist Monastery in the Department of Orne in France specialized in the inbreeding of silver-furred bunnies.

High-grade sable has always been an expensive fur—indeed, so expensive that only queens and latterly, bootleggers' wives could afford to wear it. A well-matched Siberian sable coat has been known to sell for $50,000, which is a bit higher than even the historic $35,000 chinchilla coat. Experiments are now being conducted in various parts of this country with a view of farming even these exotic creatures.

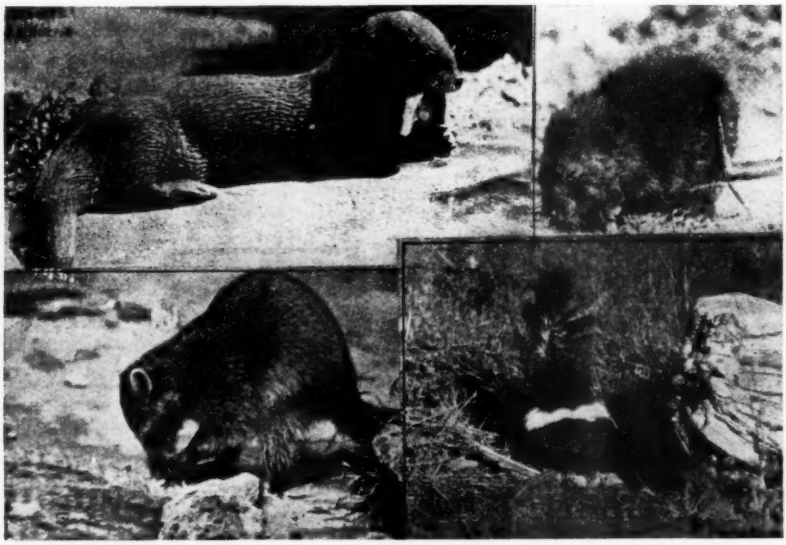


Fig. 1. Upper Left: The Otter.
Upper Right: The Adult Muskrat.
Lower Left: The Raccoon at His Bath.
Lower Right: The Skunk.

FUR FASHIONS

Not the least interesting chapter in the story of fur is that concerned with substitution. There was a time when beaver was beaver and seal was seal. But so extravagant was the kill, and so exorbitant the demand for certain types of fur that Nature, though she never believed in birth-control within her furry kingdom, just could not keep up with demand. Then too the vagaries of fashion were and are, totally too whimsical and erratic for Dame Nature's rather prosaic and standard techniques of production.

Let us suppose that arbiters of fashion chose skunk as the predominant fur for the 1931 season. What would happen? Well, exactly this: The life of a skunk would be about as precarious as the life of a squealing Chicago gangster. Skunkdom would shrink to such a size that country lanes would for a decade glorify in the unfamiliar smells of clover and new-mown hay.

On the other hand there are times when fashions in fur are controlled by supply. Today real chinchilla is not in style—nor will it be in style for years to come. And the reason for this is very simple. There *are* no more chinchillas other than the few remaining high in the Andes and elsewhere,* seeking to reassert their species.

LONDON GOES MOLEY

A fine local example of supply controlling the style was furnished some years ago by Scotland. Overrun by a veritable plague of moles, their land unfit for farming, a group of worried highland farmers went to the Queen of England and smothered their ancient instincts sufficiently long to present to their Queen a gorgeous coat of moleskin, if only she would promise to wear it. For love of the Scotch or for lack of a better coat the Queen did wear it to a public function. The ladies of London at once went moley. And as London went, so went the rest of Britain east of the Irish Sea. Scotch moleskin sold at pretty premiums, and the banks of Loch Lomond never paid better dividends.

But through the ingenuity of modern industry and the multifarious services of the color-chemist—no longer need we concern ourselves about the availability of even the most exotic of furs. So long as cats and rats and bunnies continue to subscribe to an arithmetic that only admits of the multiplication sign—just so long will the furrier have a wealth of raw material wherewith his wonders to perform.

*A California breeding venture recently reported in the press.

FORTUNES TOLD
FORTUNE TELLER:
DO YOU WANT TO KNOW IF YOUR HUSBAND STILL CARES?
DAME RABBIT:
NO! I WANT TO KNOW WHEN I'M DEAD WHETHER I'LL BE A SQUIRREL OR A SKUNK OR A SILLY CHINCHILLY

The nine lives of an alley rabbit are easy enough to understand when it is appreciated that when once Tabby has died a cat, he may be reincarnated in at least eight different ways. A black cat across your path is bad luck—across your back it is a *genet*. When a rabbit or a coney is unwrapped, the flesh, under proper treatment, becomes hassenpfeffer—but there is no telling what the pelt may become.

The National Association of the Fur Industries issues a dictionary of fur names. Over fifty varieties of fur are named therein, all having their origin in the common cottontail. And here are some of the timid little creature's post-mortem trade names—Baltic Leopard, Baltic Tiger, Baltic Lion, Chinchillette, Ermiline, French Sable, Sealine, Sealette, and last but not least the recently popular "Lapin."

Shades of Br'er Rabbit!

Jeremiah, I believe, was the prophet who propounded the oft-repeated query, "Can a leopard change its spots?" Well, if the leopard cannot, the chemist can do it for him—and better than that, he can build a perfectly *ripping* leopard out of a bunch of backyard bunnies.

FUR FROM FIDO

Equally versatile is the muskrat carcass, for it too masquerades under about as many fancy names as does the bunny. Even old Fido is not safe from the furrier. For after having

What's in a Name?

spent a lifetime protecting the home of his mistress, he may die of old age only to be dyed again a better black, and resold to his mistress. Thus he may once more serve as a protection, but for the neck only, and under the atrociously effeminate name of Isabella Fox. Poor Fido!

Execution decree 418, recently ordered in Soviet Russia, rings the death knell of 950,000 dogs of all varieties. The pelts are destined to furnish coats for peasants, a sort of a triple play, as it were—from pets, to pelts, to peasants.

It is not to be inferred from the above remarks, however, that all furriers are born prevaricators. For there has been a definite trend in recent years toward the standardization of fur names. Thus the National Association of the Fur Industry, following the lead of the London Fur Trade Association, has compiled a comprehensive dictionary of fur names and have formulated rules for the honest naming of fur material. Under their plan of nomenclature, Hudson seal, for instance, is properly described as "Seal-dyed-sheared-Muskrat."

PURE FUR LAW

Most reputable furriers have accepted the lead thus established. But there is still sufficient "bootlegging" done in the fur trade to warrant the enactment of a Pure Fur Law to take its place beside the Food and Drugs Act.

A brief dictionary of the commonest furs is herewith appended, largely to illustrate the significance of the foregoing remarks.

AMERICAN BROADTAIL: Improper name for Broadtail-processed lamb. The South American slink is sheared close and dyed black, brown or platinum. Improper name also for Asiatic (Manchurian and northern China) lamb, sheared close and dyed.

AMERICAN OPOSSUM: Opossum Family. Habitat: Southern and central United States. Coarse, yellowish tint. Tips of hair on back and sides, brownish or blackish. Underfur, thick, whitish-tan. Dyed in various shades to imitate Stone Marten, Skunk and other costly furs.

BAUM MARTEN: Weasel Family. Habitat: Germany, Italy, Switzerland, Norway, Sweden, Russia, Lithuania and Asia. Fur is very fine, silky, dense. In color it is a rich brown with a reddish-gray tint to the under-fur and has a yellow patch on its breast and throat. It has strong top-hairs. Known also as pine marten. Lighter skins are dyed a dark Russian sable shade.

BEAVER: Beaver Family. Habitat: United States, Canada, and to some extent Europe and Asia. The under-hair is close and of a velvety bluish-brown hue, and nearly an inch deep. The over-hair is coarse, and of a reddish-brown or black color. The over-hairs are generally plucked out.

BROADTAIL: Skin from the winter-killed lamb of Bokhari origin (Persian lamb). It is nearly always black. It is much smaller than Persian lamb skin and has a very silky, moire-effect fur-wool.

CARACUL: Also known as Astrachan. Sheep Family. Habitat: Tashkent, and some of the provinces of southern Russia which are also called Russian caracul. The Tashkent caraculs have the highest lustre and the finest moire markings. Russian caraculs vary in color, as brown, black, brown and black, or brown and white, and occasionally white. Caraculs are also found in China and Mongolia. These are generally white, are heavier and have a looser curl. Caraculs are bred to some extent in the United States and Canada.

CHINCHILLA: Chinchilla Family. Habitat: Peru, Bolivia and Chile. Fur is soft, dense and lustrous, and nearly an inch long. Color is a light gray with dark mottled markings on the surface and an under tinge of blue-gray. Varieties: Chinchillone from South America has a fur that is longer, weaker and more yellow than genuine chinchilla. La Plata chinchilla comes from Chile and Argentina. It is smaller, has shorter hair, darker under-hair and less pure top-hair than genuine chinchilla.

CHINCHILLA RAT: Habitat: South America. Similar to chinchilla in coloring, but the fur is coarser and flatter.

CHINCHILLA SQUIRREL: Improper name for chinchilla-dyed squirrel.

CHINCHILLETTE: Improper name for chinchilla-dyed rabbit.

CHIPMUNK: Squirrel Family. Habitat: United States, northern Europe and Siberia. Fur is a reddish-brown with three mottled stripes on the back. Barunduki is the Siberian variety. It is quite similar to the American chipmunk but has five mottled stripes on its back. The American chipmunk is not used in the fur trade.

CIVET CAT: More correctly called *Little Striped Skunk*. Weasel Family. Habitat: North America. Smaller than genuine skunk. Under-hair is short, thick and dark; top-hair silky and black with white stripes or patches covering the entire back and flanks. (Chinese Civet is sometimes called Civet Cat.)

CONY—CONEY: Another name for Rabbit, particularly those from Europe. See Rabbit.

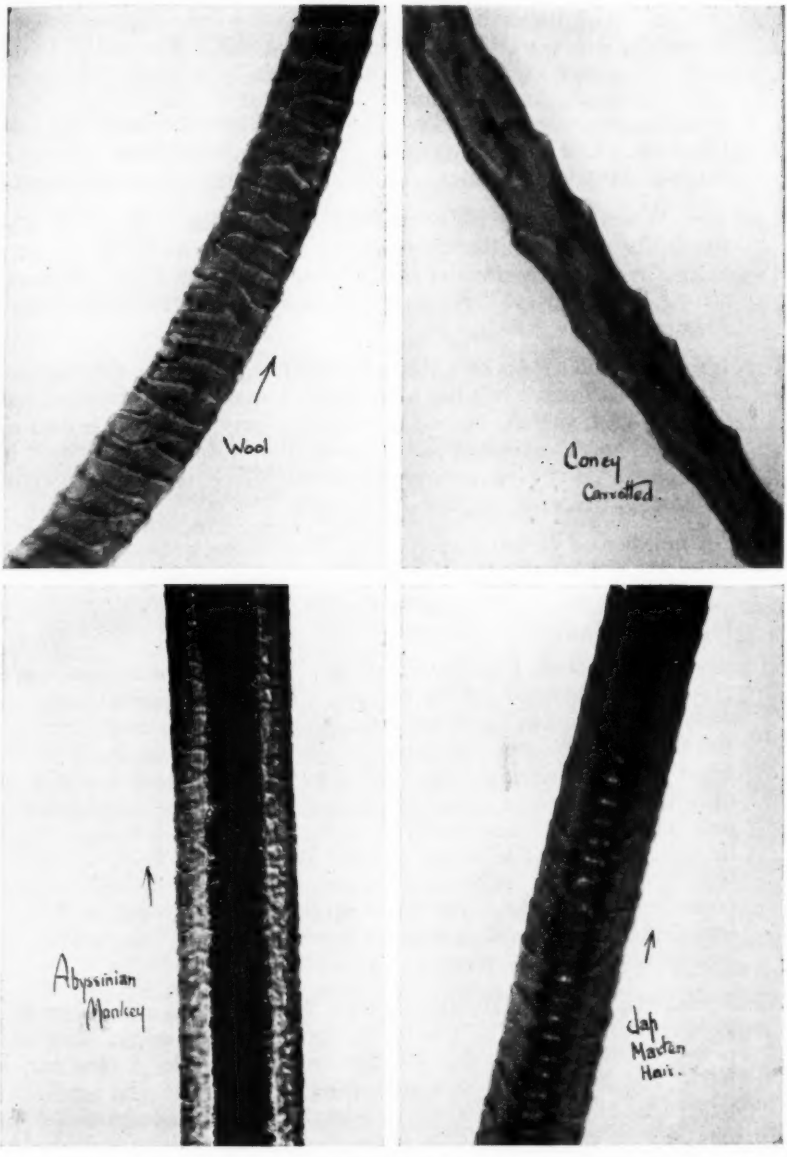


Fig. 2. Magnification: 500x Except the Monkey Fiber, Which is 250x.

ERMINE: Weasel Family. Habitat: Siberia. British America, Alaska. The under-hair is short, with top-hair slightly longer. Natural color, purest white, black-tipped tail. The white is the animal's winter color and for this reason it is sometimes called White Weasel. In the summer its coat is of a tawny-brown shade and Ermines taken with this color are sometimes called Summer Ermines. The shape is slender. Used in natural state, also dyed beige and platinum shades. Ermines are sometimes called Stoats.

FISHER: Weasel Family (Martin Group). Habitat: Canada. The fur is deep and of a dark brown turning towards brownish-gray at the head and neck; the tail is very dark; top-hairs are dark, strong and glossy. Sometimes erroneously called Canadian Marten.

FITCH: Also called *Polecat*. Weasel Family. Habitat: Europe and Siberia. German Fitch has a fine, yellow under-fur, varying from deep to light, the top-hairs are longer, glossy and dark brown or black in color. Russian Fitch is smaller, silkier, and lighter in color. *Perwitsky* is a mottled polecat which is generally dyed sable color.

FOX: A number of varieties such as the blue, cross, gray, kit (a small animal), red, silver (black with silver guard hairs), and white. The silver fox is very expensive, the natural black exceedingly rare and high priced.

FUR SEAL: Sea Bear Family. Habitat: Behring Sea region, Cape Horn, and Shetland Island regions. Northern species comprise Alaskan, Victorian or Northwest, Copper Island, and Japanese Seals. Southern species comprise Shetland, Lobos Island, and Cape Seals. Variations in quality and size of skins are due to differences in age, sex, and location of habitat. In the rough the pelt is heavy and is covered with a thick coat of dark brown guard or water-hairs. These are plucked out, leaving a dense, thick, woolly under-hair. This is dyed and the pelt on the skin shaved to reduce the weight. The finished fur is flexible with an excellent depth of color and sheen. It is very durable. Also known as Sea Bear.

HARE: Hare Family. Habitat: Europe, New Zealand and Australia. Larger than the rabbit. Fur on flanks longer than on the back and is brittle and not very durable, the leather is weak. Color varies but is usually gray on back and white on the belly. In far north pelt turns almost pure white in winter. Arctic hare comes from Arctic regions and is light gray in summer and pure white in winter. Hares are plucked, sheared and dyed to imitate costly furs.

HUDSON BAY SEAL: Improper name for Seal-dyed Rabbit.

HUDSON SEAL: Improper name for Seal-dyed Muskrat or Nutria.

KID SKIN: Goat Family. Habitat: China. Appearance quite similar to Caracul, but the leather is inferior, being lighter, stiffer and less supple. Kid skins vary in character and color according to locality, being white, gray, black and some having finer and longer hair than others.

KOLINSKY: Weasel Family. Habitat: Siberia and China. The under-hair is short and rather weak but regular, as is the top-hair. The color is generally of a tawny yellow and is almost always dyed to imitate other members of the weasel family. Also known as Red Sable, Siberian Mink, Tartar Sable.

KRIMMER: Sheep Family. Habitat: Crimean Peninsula, Russia. Gray or slate-colored. They are of a similar nature to the Persians, but are looser in curl.

LEOPARD: Cat Family. Habitat: Africa, Asia. The fur is mostly pale-fawn or rufous-buff spotted over with dark brown or black rosettes or broken rings; there is an occasional black one. The leopard is also known as panther.

LYNX: Cat Family. Habitat: northern North America and Europe. Under-hair is thinner than in the fox, top-hair is fine, silky and flowing, of a pale gray, slightly mottled with fine streaks and dark spots.

MARMOT: Squirrel Family. Habitat: Russia, Siberia, Manchuria and Mongolia. Skins taken in the spring have a reddish-yellow underground and are smaller in size and have a drier pelt than those taken in the fall. In the fall the skins are prime and the fur is fine and silky with a bluish under-fur.

MINK: Weasel Family. Habitat: North America, Europe, Japan and China. The American mink has a soft, dense under-fur with long, stiff, shiny guard-hairs. The color varies from a light brown to a rich dark brown, the chin is always white and there are often small patches of white fur on the underbody. The darkest skins come from Nova Scotia, Quebec, northern New England and northern New York. The mink from Canada and Alaska are sometimes called Northern mink and Alaska mink and have heavier fur. The Russian mink is brown in color and darker in shade than the ordinary American mink, but the fur is flatter. European mink is of a reddish-brown color, the fur being inferior to the American species. Japanese mink or Itachi weasel are of a pale yellowish-brown fur which is always dyed before using. The Chinese mink, usually called Chinese weasel or Shantung weasel, excepting for a slight difference in quality, is quite similar to the Japanese mink.

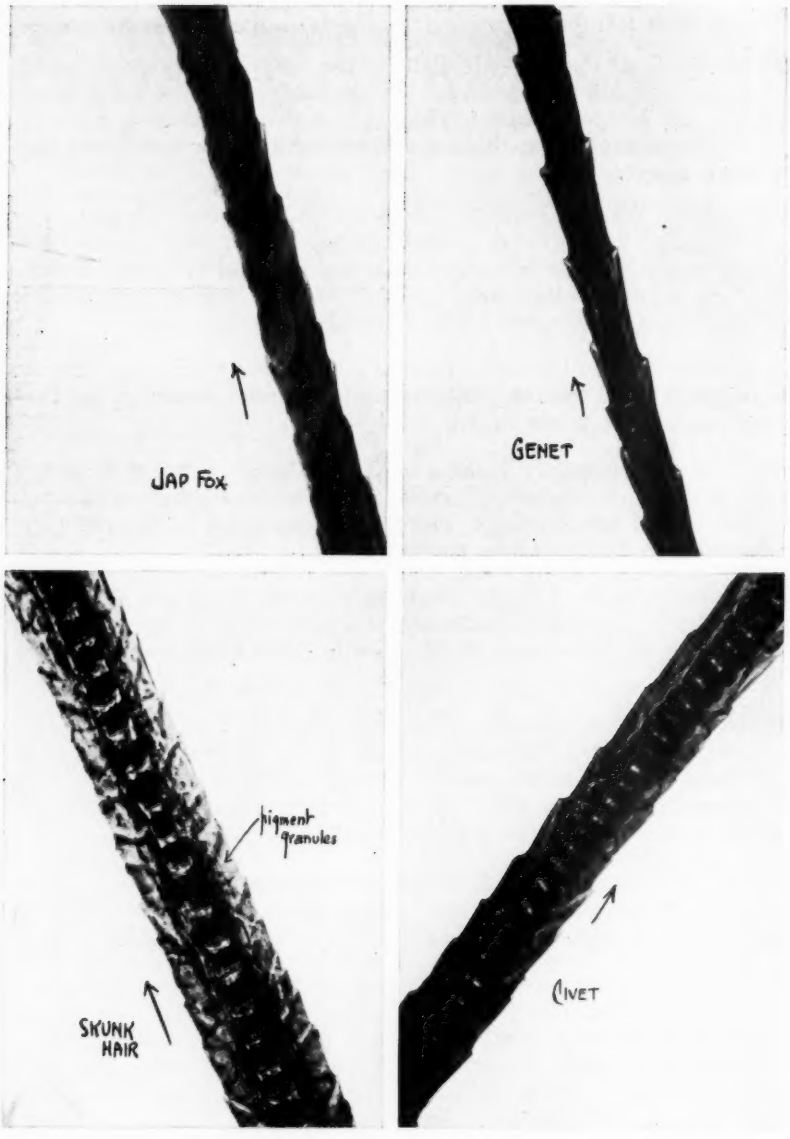


Fig. 3. Magnification: 500x.

MOLE: Mouse Family. Habitat: Great Britain, European Continent, North America and Africa. Scotch mole has a short, velvety fur, deep slate-blue in color. The Dutch mole is larger than the Scotch

but not as full and silky in fur. American varieties are inferior. African mole has a silver-brownish cast on the back, short fur. In general appearance it resembles the belly of a Southern muskrat.

MOUFFLON: Trade name used for past fifty years to describe certain members of the Goat Family. Habitat: northern China, Mongolia and southern Russia. The Russian are a little finer in hair and smaller in size than the Chinese. Most Moufflons come from China. The skins are plucked and dressed, the under-fur which remains is long, soft and silky. Moufflons are larger in size than Thibets, Thibetines or Mediterranean sheep. Color, natural gray, natural brown, also white. They are processed.

MUSKRAT: Rat Family. Habitat: widely distributed in North American swamps and in regions of rivers and lakes. Three times as large as ordinary brown rat. Natural Black rats come chiefly from Central Atlantic States. They have full heavy top-hair and uniform charcoal-black coloring. Southern top rats come chiefly from Texas and Louisiana. They are more varied and lighter in color than the natural black rats, but have longer top-hair, fuller fur and are darker than the other Southern rats. Southern rats have flatter pelts and are of a bluish-brown color. Northern rats come from the northern United States. They have a weaker leather than the Southern rats, but have a silkier and heavier under-fur. In their natural state they are of a reddish-brown color. The Canadian and Alaska rats have silky hair, but the pelts are tender. Rats are a deeper shade on back, lighter on belly and sides. Also known as Musquash. Rats are sheared and dyed to imitate seal.

NUTRIA: Coypu Rat Family. Habitat: streams and waterways of South American countries, chiefly Brazil and Argentina. Color, speckled, yellowish brown or light brown; they are occasionally dark-skinned, almost black on the back. Dense under-fur and durable. Unhaired and dyed to imitate seal. Blended to imitate beaver. Also known as Coypu. Misnamed South American beaver.

OCELOT: Cat Family. Habitat: Texas to Patagonia. Color, yellowish or reddish-gray, nearly white underneath, thickly marked with elongated black-edged spots and blotches. Also known as Leopard cat and Panther cat.

OTTER: Weasel Family. Habitat: Europe, Asia, Africa, North and South America. About 3½ feet long; color varies with local distribution from light to dark brown. Lighter underbelly and neck. Under-fur very thick. Varieties: American or Canadian otter, European otter, African otter, China otter, Indian otter, Brazilian otter, Feline otter. Used in natural and dyed state.

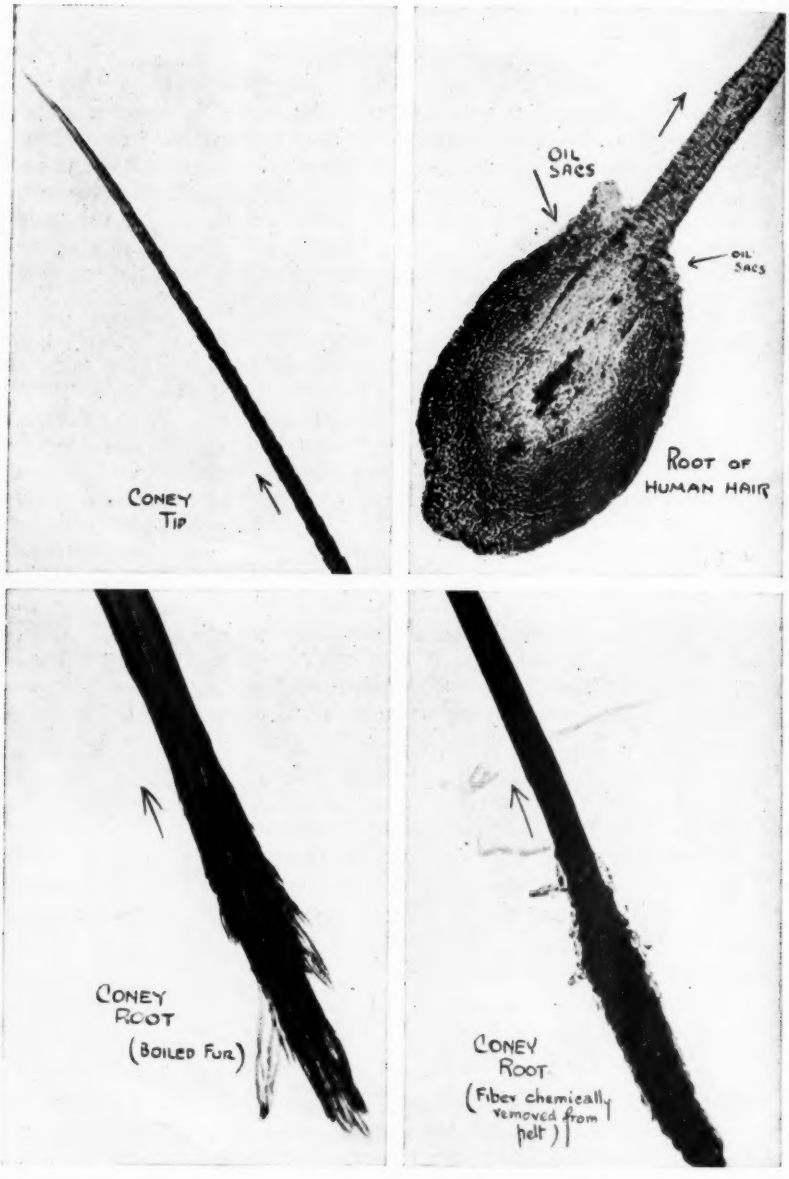


Fig. 4. Magnification: 500x Except Hair Root, Which is 100x.

RABBIT: Hare Family. Habitat: Belgium, France, Germany, England, Asia, New Zealand, Australia. Fur is thick and fine, but the pelt is very weak. Natural colors are white, tan, gray, mottled. Plucked, sheared and dyed in imitation of costly furs such as Seals, Ermine, Chinchilla, and dyed Muskrat. Also prepared in natural state or dyed to imitate foxes and similar animals. Cony, Coney or Lapin is another name for Rabbit, particularly those from Europe.

RACCOON: Raccoon Family. Habitat: Temperate North America and Mexico, especially northern, central and southern parts of the United States. Color, gray or grizzly, with longer black and white hair, abundant under-fur in dark hue. Tail short and bushy, marked with dark rings. Southern grade flatter in fur and poorer in color. Dyed black to imitate skunk.

RUSSIAN PONY: Horse Family. Habitat: Lower Volga region and Siberian steppes. Hair thick and more furry than the ordinary American horse. Colors are chiefly black and brown.

SABLE: Weasel Family. Habitat: Russia and northern Asia. Russian Sable has fine, very close and soft under-fur, the top-hair is regular, fine and silky. The color varies from a pale yellow to a rich dark brown with bluish tone. Occasionally the pelts have silvery hairs distributed over the skins. The American marten is sometimes improperly called Hudson Bay Sable.

SEA OTTER: Weasel Family. Habitat: Aleutian Islands, Western Alaska shore and Kamchatka Peninsula. 4 to 5 feet long, exclusive of tail. Color varies from light brown to black; general shade, dark brown. Fur rich and soft, under-fur bluish. Inferior grades have yellowish hue. Dyed Seal color. Commercially extinct except in Kamchatka region.

SKUNK: Weasel Family. Habitat: United States, Provinces of Ontario and Quebec, Canada. Color varies from jet black to pure white. Black groups have white stripe on head and white tip on tail. Intermediate groups are black with two white stripes. Under-fur is full and silky with flossy, flowing top-hairs. In most cases the white stripes are cut out or the skins dyed all black.

SLINK: Sheep Family. Domesticated varieties of lambs. The skins in use are those of lambs stillborn, killed or dying soon after birth. Dyed, sheared, and stamped, it is improperly named American broadtail or broadtail lamb. Dyed in gray or blue, it is improperly called Krimmer or Krimmer lamb. Dyed in black, it is improperly called Persian, Shiras, or Astrachan seal.

SQUIRREL: Squirrel Family. Habitat: All countries; only those of Russia and Asia are of significance to the fur trade. Russian

skins vary in size and quality according to location. The back is an even, close fur, varying from a reddish-brown with a yellowish belly to a dark blue-gray with a flat white belly. Steel-blue color fur comes from Tobolsk, Yabutsk and Okshotsk. Ears of the Siberian varieties are tufted and are black in color as is the bushy tail.

STONE MARTEN: Weasel Family. Habitat: Balkans, Turkey, Asia Minor, Greece, Russia, France, Italy, Switzerland, Denmark, Ireland, Cashmere (India), Central Asia. Fur is coarser than Baum Marten and has an ashy-gray under-fur with long outer hairs of dark brown tipped with black. Skins from Turkestan and Afghanistan are larger than the European variety and have long, glossy black guard-hairs with a pearl gray under-fur.

VICUNA: Camel Family. Habitat: Plateaus of Peru and Bolivia. Soft and light wool of an orange-red color. Made natural and dyed. Misnamed Vicuna sheep.

WOLVERINE: Weasel Family. Habitat: Northern regions of both hemispheres. Under-fur thick, woolly; top-hair long and coarse. Color, blackish-brown, with distinct bands of chestnut-brown running from the shoulders down the flanks. The hair at the front and sides of the head is light gray. Eastern hemisphere specimens have darker fur. Characteristic is round mark on back (saddle-like or oval-shaped). Frequently dyed black.

The Preparation and Preservation of Fur

The scope of this presentation is entirely too limited to permit extensive consideration of the art and science of taxidermy in so far as it applies to fur apparel. Sufficient to state, that it is a practice as old as man himself, and one which, by that token alone, should have achieved well nigh to perfection. The physical and chemical processes, whereby the skin is rendered wearable and attractive are as diversified as the skins themselves. Tricks of the trade, too, are just as numerous. Superficial coloring of the tips of fur; pointing a black fur through the trick of inserting tufts of longer white fibers such as badger; bleaching a naturally dark fur because ladies as well as gentlemen sometimes prefer blondes—all of these physical and chemical tricks are so marvelously done that only an expert can detect them. The partitioning of pelts and the matching of such pelts, to effectively blend in the garment, in addition to the close stitching together, all require a highly organized and developed technique.

FUR QUALITY However, the quality of all fur pelts depends not only upon the furrier's work, and fur qualities inherent to the species, but greatly upon the method of trapping and the season of collecting. Thus, summer fur is noticeably impoverished through nature's moulting provision, and winter fur is rich and compact through an equally wise protective provision. Yet in spite of legal restrictions against warm weather trapping, such skins do enter the market in large numbers. Blue skins, so called because of the corrupted blood yet remaining in the pelt, are poor in quality because of the immaturity of the fur. Such skins are usually taken in early fall. Shedders are late spring catches, the skin having been taken from the animal while moulting is just commencing. These skins, through an epidermal dilation, will continue to shed long after removal from the animal.

Water animals, such as the beaver, nutria, muskrat, otter, etc., have a coarser, more durable fur on the back, and downier, finer fur on the abdomen. The reverse is true of land animals. Generally speaking, garments made from water animal fur are more lasting than garments made from land animal fur of the same texture. Thus otter and beaver are about the most durable of fine furs.

Strangely enough, with water animal fur, since the darker, heavier fur covers the back of the beast, and the lighter, downier fur covers the abdomen, the darker the color of a fur garment of such origin, the longer will be its expectancy of life.

This refers, of course, to undyed material, for no matter how dyeing is done, fur constitution suffers from it.

High altitude and cold climate also favor the quality of fur, sea level and warm weather animals exhibiting a much inferior quality of fur.

Thus Scotch coney, from the braw Caledonian country, is far superior to Australian coney.

Strangely enough, too, as if by some compensating mechanism, the thin-skinned pelt is frequently thickly furred, and the thick-skinned pelt is very sparsely fibred. Consider, on the one hand, the hare, and the bristled pig on the other.

MOTH HABITS The preservation of completed fur garments is as much of a problem sometimes as the preservation of the fur on the pelt. Moths just love to build their nests in raccoon coats or any other fur piece. They burrow right in to lay their eggs

(50 to 200 eggs per moth), and having done so, cackle awhile with *moth*erly pride, then foolishly fly to the nearest flame before the housewife swats them. It might be noted, however, that the moth on the wing is generally the papa moth, for mamma moth, before laying her eggs, is so burdened that she cannot well fly, and having done her work she promptly dies.

Meanwhile the eggs are hatched (eight to ten days), the grubs stretch out and yawn—itching all the while to commence their gastric offensive. Soon they go to it. Fur fibers fall like a stand of timber in a cyclone, as the advancing hordes eat with unwarranted appetite. By the time they have gorged their way to cocoonity, (life in the larval stage lasts from three to eighteen months!!) in the meantime not being any too finicky about their sewage disposal, the coat is a mangy mess. From the cocoon to the flying moth is a matter of two to six weeks, and their life is almost over. Two to four weeks of existence as a flying moth is all that is left and as eaters their day is done. For the moth butterfly does not eat to speak of. Yet the common notion, that a flying moth is not to be regarded as a menace, is quite ridiculous. For then is the time they really *brood* disaster and inspire the egg-laying contests.

MOTHERLY ADVICE

Today there is no excuse for much moth damage. Cold storage facilities and chemical preservatives are so available and so effective in prevention. Among the chemicals, watery or solvent solutions which are used for protection (often a part of the dry-cleaning process), mention is made of certain quinine, strychnine, and fluorine compounds, as well as many synthetic coal-tar chemicals such as constitute larvex, eulan, tinolan, and other mothicides. Paradichlorobenzene and its variants also have considerable value. A 10 per cent. solution of liquid formaldehyde in 70 per cent. grain alcohol is also a splendid mothicide, and a fine disinfectant as well.

Absolute trust in this connection should, however, never be placed in the sparing use of the so-called gum camphor nor in its malodorous coal-tar namesake, naphthalene or tar camphor. These chemicals are valuable only when used in large quantities. Cedar oil, chips and closets are also undependables. Far more effective are the methods mentioned above.

For completely de-bugging and de-egging raw fur, that is, on the pelt, if the volume permits it and equipment is available, cyanide gas

or the newer carbon dioxide and ethylene vacuum fumigation methods are absolutely specific.

Before dismissing the question of preservation, mention should also be made of the tendency to putrefaction so frequently noted when warm, moist furs or fur materials are permitted to be packed together over a period of time, particularly so in warm weather. Much

Fig. 5. Life Stages and Wages of the Moth.

damage occurs in the hat industry through a neglect to appreciate this fact and to avert it by refrigeration or desiccation.

The Physical Nature of Fur

Physically the fur or hair fiber is an extension of skin substance, and no matter how different it may appear in its various forms, from fuzzy down to rigid bristle, it is on the whole a remarkably uniform animal tissue.

A distinction should be made here between hair and fur, and it might be termed an Einsteinian distinction, for it is again a matter of relativity. The finer, shorter and more dense fiber upon the animal body is termed fur, whereas the longer, coarser, more deeply rooted fiber is referred to as hair. Both are worn by the same animal, and various unplucked pelts in commerce are by this token held in higher esteem. Thus sable, marten, fox, lynx and others exhibit both hair and fur, whereas the fur seal, beaver, coney and muskrat are more commonly plucked so as to dispose of the hair and leave only the more lustrous and downy fur. Then too there is that type of fiber, the pelt end of which might be termed fur, the distal end however increasing to such size that it more nearly resembles a hair.

HAIR GROWTH

Each individual fiber, whether fur or hair, arises from a bulb-shaped depression in the epidermal tissue, growth occurring in much the same fashion that shaving cream or toothpaste is extruded from a collapsible tube, except of course that fiber growth is a slow-cell-multiplying process. A keratinizing or hardening occurs as the hair shaft reaches the skin level, and growth thereafter seems impelled by additions to the base from the multiplication of cells of the papilla. The collapsible tube analogy may be continued here, for while the paste within the tube remains plastic, the extruded paste, if permitted to remain in the air, hardens and shrinks a little, just as the hair fiber hardens. Within the fiber itself, contrary to common opinion, there is no real life, for no blood or nerve supply is carried up the shaft. If there were life in the hair fiber—life in the physiologic sense, the kind of life that nerve and blood produce—a trip to the barber's chair would mean much more than it now does.

The barber's pole with its stripe of bloody red would return to its original surgical significance, ether would replace lilac and soap give way to sterile salt solution.

No blood or nerve supply goes beyond the papilla, or the very root of the hair. Proof of this is in the fact that pain is experienced when a hair is pulled out by the root, whereas it may be cut or shaved off without the slightest nerve shock.

FRIGHT WHITE This also discounts the oft-repeated tale of hair, through shock of fright, turning to white just overnight. Physiologically this would be impossible, for the pigments of the hair once pushed up the hair shaft are detached from blood and nerve supply, and are therefore unaffectable by any nervous shock.

The fiber is composed of four structural parts, namely: the *medulla* or pith, which is the central column, the *cortex,* which surrounds the pith and corresponds to the wood of the tree, the *pigment granules* upon which depend the color of the hair and which are scat-

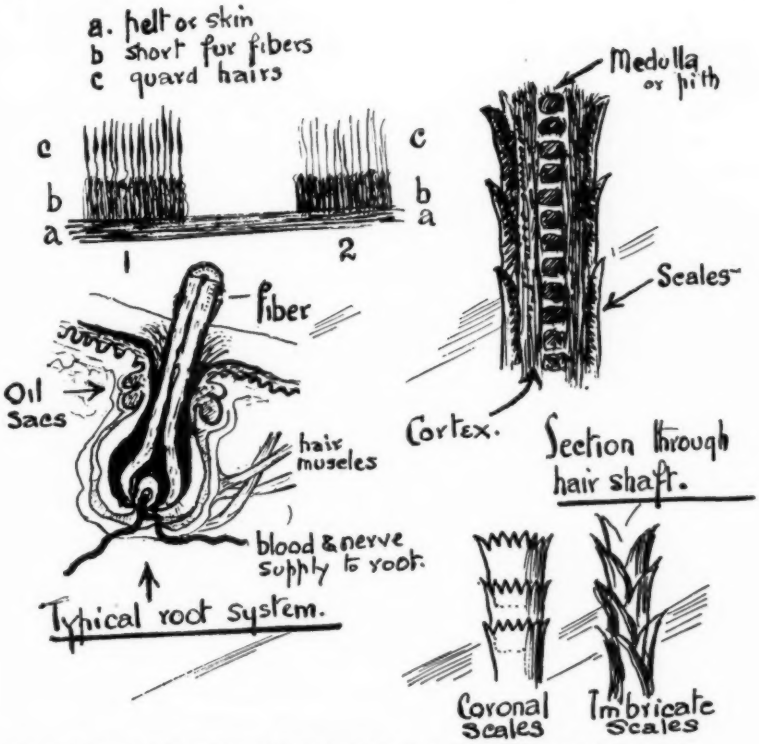


Fig. 6. Upper Left: Section of Pelt Showing Fine Fur Fibers and Guard Hairs.
Upper Right: Longitudinal Section of Fur Fiber.
Lower Left: Longitudinal Section of Fur Fiber in the Skin Showing Root Processes.
Lower Right: Two Main Types of Cuticular Scales.

tered throughout the cortex and frequently within the pith, and finally the *scales* or *cuticle,* composing the surface of the fiber, very much as scales constitute the surface of a fish. The luster of fur fibers depends largely upon these scales and an overworked fur, having been deprived of its scales, will lack luster.

These cuticular scales are important factors in the microscopic identification of fur fibers, and there are certain well-defined constants established by persons who have made a diligent study of fur microscopy. Thus the scale types fall roughly into two classes, the *coronal* and the *imbricate.* The coronal or the tufted type may be simulated to a stack of drinking glasses, without bottoms, each fitting into the other. The imbricate types are arranged around the cortex, without individually encircling it, but rather like slate or shingles upon a church spire.

And while there are great variations in the fur or hair of even the individual animal, depending largely upon its origin upon the anatomic landscape, yet the following differential facts have been well established.

(a) The kind and size of scales are dependent largely upon the diameter of the shaft, which by the way may vary anywhere from 6 microns ($\frac{1}{4000}$ of an inch) to 250 microns ($\frac{1}{100}$ of an inch) or more; and the thinner the fiber the longer the scale.

(b) In the finest and downiest fibers one always finds the coronal type of scales. Thus bat fur, the otter and fine beaver fibers are always so marked.

These scales act in a protective way much like the shingles or slate upon the roof (See Fig. 4, Coney tip), and the durability of fur partly depends upon the integrity of these scales. Thus a clipped fiber is much weaker than an unclipped fiber, for the process of clipping robs the end of the fiber of its protective covering of scales (See Fig. 7, Clipped hare fibers), and permits it to dry and fray out. So too will an overprocessed fur hat lose its scales and hence its so-called "life."

The pith or medulla of the fur fiber while it varies some, even in the same animal and certainly within the species is, as with the length of scale, seemingly regulated by the diameter of the shaft containing them. The coarser the fiber the more nearly continuous is the pith. Thus human hair and monkey hair rarely if ever exhibit the fragmented or discontinuous pith substance.

As one might expect, too, the less pith shown by a fur fiber, and consequently the more cortex, the more durable will be the service of

that fiber. And since mention is made of durability it may be interesting at this point to furnish a table which has been accepted as fairly reliable in delineating the expectations of life of various fur garments. Note, however, that this table is only relative and does not indicate the comparison between the tensile strengths of the various fur fibers, nor between felts made therefrom.

TABLE OF DURABILITY

Otter	100†	*Coney (Scotch)	20
*Beaver	90†	*Hare	5
Fox (natural)	40	Wild rabbit	5
Fox (dyed)	25	Pony	35
Genet (cat)	35	Raccoon	65
Mink (natural)	70	Seal	80†
Mink (dyed)	35	Sable	60
Mole	7	Squirrel	20
*Muskrat	45†	Leopard	75
*Nutria	25†		

*Hat furs.
†Water animal furs.

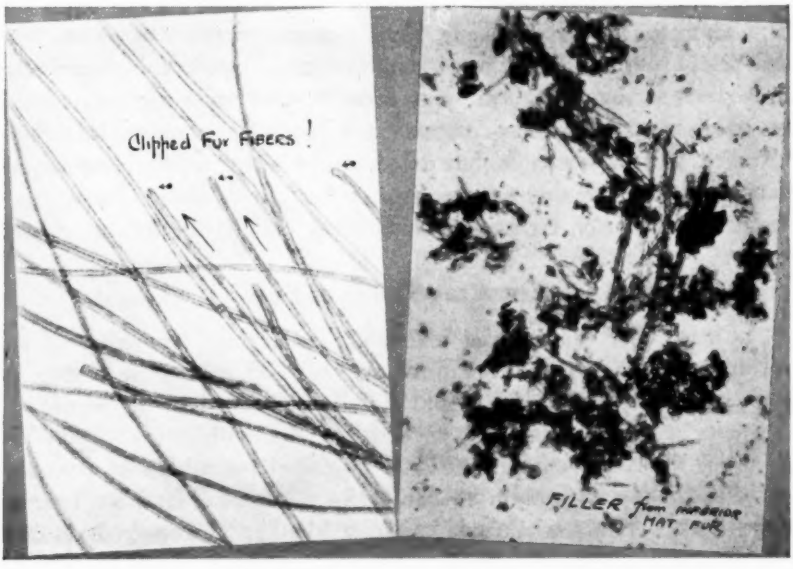


Fig. 7. Left: Clipped Hare Fibers.
Right: Coney and Hare Fibers and Powder Filler From Inferior Hats.

The pigment which gives fur and hair their characteristic color is deposited most commonly in the cortex, where it is rather uniformly distributed, although the pith or medulla is sometimes tinged with pigment. A quaint caprice or else a purposeful plan of nature is, that with few exceptions wild (infrahominid) animal fur is dark or light dependent upon distance from the Equator and correspondingly from the poles. Polar creatures are predominantly white; equatorial animals are commonly colored. The nature of the animal's diet, too, controls the color; thus a protein-high diet will in time cause much variation in animal hue.

FUR DERMATITIS

An idiosyncrasy to fur garments such as a skin eruption is occasionally exhibited by wearers, and often this is correctly attributed to the specific protein present in the fur. Very commonly, however, the offending substance is a chemical introduced during processing. Diamine dyestuffs may have been used, for the ursol or diamine type of dyestuff (paraphenylenediamine and others) are extensively used in developing browns, grays and blacks, on apparel furs. Indeed these dyestuffs used in shoe polish or on fur have been known to produce death in persons highly sensitive to their poison.

Then too the troublesome tannins used for some types of furs and pelts are often the cause of health damage, locally or systemically to persons strangely susceptible to them. Sweat leathers, in hats, occasionally, and for similar reasons cause forehead eruptions. In such instances not the dyestuffs, but the sweat secretions of the wearers, or personal idiosyncrasies, are responsible for the trouble. Hat manufacturers have been frequently erroneously blamed for this condition.

Chemical Nature of Fur.

Chemically, fur belongs to the organic group, by virtue of its carbon nature as well as its animal origin. Did we resolve it into its elemental composition we would find it composed of a quintet of elements namely—carbon, oxygen, nitrogen, hydrogen and sulphur in about the following proportions—a proportion which by the way varies little for all protein substances in this class (feathers, human hair, horse's hoof, whalebone, tortoise shell.) Carbon: 50-55 per cent., oxygen: 20-23 per cent.; nitrogen: 16-18 per cent., hydrogen: 6-7 per cent. and sulphur from 2-5 per cent. To the sulphur content

may be attributed a great many troubles encountered in the carroting and dyeing of fur. The arrangement of these elements, in the molecule places fur in the category of protein substances, and so establishes a family relation between it and such substances as cheese (casein), glue (gelatin) and the froth astride an egg-nog (albumin), and many other such products.

ODD AMINO-ACIDS

In common with protein molecules, fur substance is built up of a series of amino-acids. An amino-acid is a queer chemical contraption half acid and half alkali. When two such groups are joined water results as a by-product, and the conglomerate formed referred to as a peptid linkage.

A peculiar property of such a peptid linkage is that it retains one acid terminal and one basic terminal. When such compounds are attacked by either acids or alkalies, and even by enzymes in the presence of water, they will go into reverse, steal back their drink of water (chemists call this hydrolysis), and become individual amino-acid molecules again.

That, by the way, is the body's technic of digesting a beefsteak, of hammering down its complicated molecule to tiny amino-acids, small enough for the blood cells to grab and claim them for their very own.

The dual nature of a protein molecule also permits it to act under certain circumstances with an acid, such as nitric acid, to produce a salt-protein nitrate, (of such composition is the yellow stained produced when nitric acid is placed on the finger nail) and with an alkali such as caustic soda, to produce another kind of a salt—sodium proteinate.

In connection with cleaning, dyeing and preserving furs the double nature of fur in this as well as in its water reactive qualities, must always be borne in mind. Note too, that the total removal from fur, by dry cleaning solvents, of its natural grease content is detrimental to fur life and luster. Animal furs vary in this grease content, water animals exhibiting the most. By virtue of its constitution fur has an unusual property of keeping in moisture equilibrium with the atmosphere. Thus bone dry fur, fresh out of a drier can add 10 per cent. or more of its weight of water from the air, within a few hours. This property of fur and hair substance accounts for their use in barometers and such instruments.

HAIR—HOOFS—HORNS

Fur, for purposes of chemical study, is placed in the protein sub-group—sclero-proteins or albuminoids, along with such substances as nails, animal hoofs and horns, etc. Generally speaking fur is practically insoluble in water, although it may surprise even those familiar with fur handling on a large scale to be informed that it loses about 1 per cent. of its weight upon prolonged boiling with water. This is true of raw fur, of chemically treated fur and of fur which has had its natural grease removed with ether.

Acids attack fur variously. Strong hydrochloric acid completely dissolves it, within twenty-four hours breaking it down into its simpler amino-acids. Nitric acid reacts upon its tyrosin content, producing a yellow color, and if nitrate of mercury be present a salmon color (Millon's reaction) is produced. Sulphuric acid (vitriol) in dilute solution actually *unites* with fur substance, whereas concentrated vitriol chars and destroys it.

Alkalies of all kinds rapidly attack fur, seeping under the protecting scales and attacking the cortex. Thus the use of strong alkalies is absolutely interdicted in the cleaning and treating of furs. Thus too, is explained the alkali method of dehairing animal pelts, as done in the leather industry.

Although gelatin and albumin (white of egg) are first cousins, chemically, to fur, it is to be noted that the former are water soluble, whereas the latter is relatively insoluble. However in their chemical behavior they act in some respects alike. Soluble salts of mercury, of lead, of barium combine with all three. Formaldehyde hardens all three. Moist white of egg, however, is somewhat in reverse with respect to fur substance, in its heat complexes. Thus heat permanently clots or hardens egg-white, whereas fur substance softens and softens as often as we want it to.

In the hatting industry practical use is made of the fact that fur links chemically with mercury, nitric acid, barium, organic and inorganic peroxides and other substances, such linkage increasing the felting property of fur. This operation is called carroting and is the *most important* underlying operation in hat manufacture.

The iso-electric point of fur substance is somewhere close to a pH of 5, that is, quite on the acid side. This has been determined by dyeing over a pH range from alkaline to acid and noting the point where neither an acid nor a basic dye made any impression upon the fur substance.

At such a point there exists a maximum hydration of the inner portion of the fiber, and as experience proves, a consequent high degree of felting quality. Well-informed hatters have empirically known this for years, and have consequently aided the stumping or felting of hat bodies by adding vitriol or acetic acid to the sizing kettle.

That temperature largely controls fur workability is also a matter long known and practiced by the hatting industry. Fur substance below a moist temperature of 140° F. appears to have properties quite dissimilar to the properties which it exhibits at higher temperature. Below 140° F. its cortical contents are rigid and repellant to water. Above that temperature however, the fiber becomes plastic and friendly to water, such characteristics becoming even more manifest as the water approaches the boil.

ART OF THE ANCIENTS HOW NOT WHY!

The rough research of the hat industry, long before science entered the field, had discovered these facts, and had applied them to practice. Thus, for time immemorial, in the forming room of the hat factory, the newly formed cone has been dipped into a vat of water, at a temperature of about 150° F., wisely starting the hat on its road at the lowest "working" temperature. So too, long before the scientist had evolved the term surface tension, the old hatter had learnt to dissolve a small cube of soap in this dipping vat. On such premises, too, dyeing of fur, has always been done at or near the boil, and the sizing or shrinking of hats is done at the same temperature.

It seems that our forefathers had the gift of knowing *how,* even though sometimes they might not have known *why,* and it is a question, today, whether in a mad scramble to know the why of everything we have not sacrificed to some degree the art of knowing how.

On such grounds patients die, though the operation may be a success—and on similar grounds industries often *suffer from improvements.*

THE MECHANICS OF FELTING

Felting of fur as a physical phenomenon has never been adequately understood, although a great many theories have been advanced to explain it. Raw fur* felts with difficulty, whereas fur treated with certain chemicals and

*Wool felts without chemical treatment, and with less water and at a lower temperature than does fur.

worked in acidulated boiling water, felts very rapidly or very slowly, depending upon the chemicals used, the rapidly felted product being less tight than that which is felted gradually.

The barb theory of felting, namely that the barbs on carroted fur cause the fibers to interlock is not tenable by itself, for there are varieties of raw furs with barbs as sharp as arrowheads, yet not possessing the felting property.

The probable explanation of felting lies in a combination of many factors, among which are the dual natures of the chemically treated fur substance, the mucilaginous oozing of the plastic cortical matter between the intermeshed scales or barbs, the effect of surface tension, noted by the fact that fur completely and continuously worked under boiling water will not make good felt, and lastly the fact that as the pith and cortex of the individual fiber swells laterally, the fiber shortens in length and tightens the scales accordingly, in such wise that intertwining and interlocking of the fibers becomes more certain.

Of course felting is a phenomenon which the fur garment industry avoids, whereas in the hatting industry it is the most important factor of the entire process of making good hats.

Other Uses of Fur

Apart from the use and usefulness of fur on the pelt for garment purposes, which is indeed its greatest contribution to comfort, it has innumerable other applications, cut and uncut.

Not the least of these applications is its use as previously intimated in the felt hatting industry—masculine and feminine. But few people know that a good felt hat is made exclusively of treated fur, for it is given to most of us to accept or purchase such commodities without regard to their origin, providing they give results.

HAT-MAKING

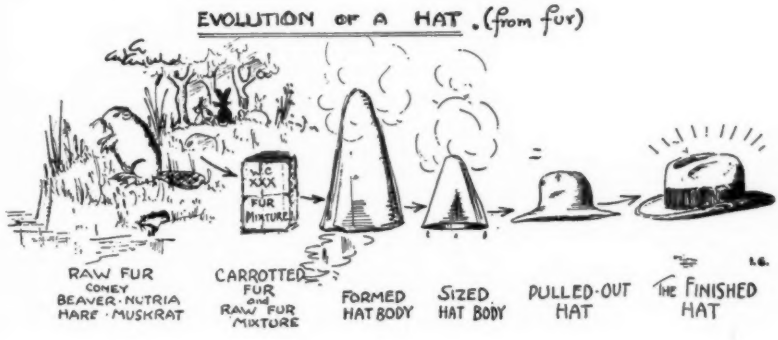
Briefly the process of making a fur felt hat is this. After the fur has been treated (carroted) on the pelt with certain chemical substances, this to enhance its felting properties, the treated pelt is aged. (One large hatting concern has for years kept in such storage an annual inventory of nearly fifteen million skins of coney, hare, nutria and beaver.) The fur is then ingeniously cut from the pelt, blown (air sifted) to drop the hair carrot and pelt dags and blended in various combinations by a mixing or blowing device. Usually about 10 per cent. of raw fur (in Amer-

ica, muskrat; in Europe, hare or coney) is added to the blend so as to produce a lustrous surface or veneer upon the hat. Sometimes for pastel shades the fur is colored at this point—sometimes not. (Small hatting concerns purchase cut fur, or blown fur, as it is called, and this material has been so frequently adulterated that it has been most unsafe to procure it except after proof, by experiment, of its hat-making possibilities.)

A quantity of blended fur mixture is then blown on a large revolving perforated cone about two or three times the height of the finally sized hat, the fur surface meanwhile being kept moist with warm water or steam. The cone size chosen depends largely upon the mixture. Thus a poorly felting fur is given a smaller cone, the better felting fur a larger cone.

This cone with its veneer of fur is then dipped for a time into moderately hot water, lifted out, inverted, and the flimsy fur body slipped off. This thin form is now worked through various operations hand or mechanical or combinations of both until it felts and shrinks to a much reduced cone shape—sometimes the hat is colored at this stage. Next a shellac solution, aqueous or alcoholic, white or amber, is forced into the lower rim of the cone, so as to provide the desired rigidity and plasticity to the brim of the finished hat. Inferior hats are frequently shellac or gum stiffened in the crown as well as in the brim.

This cone shape is then plunged in boiling water, rounded out at the tip and pulled out or bent at the band, in order to differentiate the crown and brim. This rough body is then stretched over a block to its desired shape. Finishing and trimming are next in order. All together some fifty-six odd operations are required to build a good soft felt hat.



The so-called Derby hat, variously known as the iron hat, the black Maria, etc., is strangely made of amber shellac and fur, about half and half.

Inferior hats are made of wool, boiled fur from scraps, recovered fur from roundings, fur choppings, talcum powder and all manner of cheap material.

As previously mentioned, cut and blown fur has always been a much adulterated article of commerce, although today the intelligent use of the microscopic and chemical analysis readily prevents such sophistication.

In recent years, manufacturers of even high grade hats have had their share of worry, searching for raw material, due largely to the fur garment demand, and to the vagaries of finicky fashion.

The demand for light colors in men's headwear, to say nothing of the pandemonium of pastel perversities demanded by the color-loving ladies of the day, have shifted the hatter's cut fur market far from its old drab grey backgrounds to the light and even white skins of the hare and rabbit. Yet it is more than likely that research will develop before long, a great many other fur ingredients, suitable for hat manufacture.

BLEACHING FUR So far, bleaching the darker fur has not produced a worthy hatter's product although, for garment purposes, bleaching has proved quite useful. Such bleaching has been held a secret process, closely guarded in Germany, though strange to say, not nearly so secret as the Germans think it to be. Indeed, catalytic processes of oxidation well known to research workers, are capable of bleaching the deep grey coney fur into a clear white product. For high grade hats, however, such fur is not of sufficient merit although in the fur garment industry it does have a value. The lighter shades of lapin are achieved in this way.

The strange affection which America seems to have for the achievements of foreign scientists is also noted in the story of bleaching straw braid, for years considered exclusively an English performance, but now done equally as well on this side of the pond.

The successful coloring of fur has also been claimed to be a definite foreign monopoly. Neither is this true, for the scientific approach to this problem by American workers has brought great advances into the art. Fur garments and fur hat bodies and mixtures are quite as well dyed here as abroad. Control of the water supply,

a careful selection of background and carrot, dyestuff and process, have produced results hereabouts that need not take second place to any foreign article.

FUR IN TEXTILES

Latterly another important fur use has been its incorporation in textiles. Camel fur, llama, alpaca, vicuna, white coney, and various such fibers have been actually woven along with wool, etc., into the cloth in such a a wise that these fibers emerge as a curly nap. Camel hair cloth in its various forms is so manufactured, and has, under fancy names, achieved to quite some popularity.

The insulating properties of fur,* its lack of heat conductivity, have also found use in various directions. Mention might also be made of its wide use in the fine brush industry—rather a quaint commentary upon such application being the use in artists' brushes of the furry lining of ox ears.

FUR BRUSHES

"Making a purse out of a sow's ear" can be considered a typographical error, for if we change the word into *cow,* the proverb becomes a truism when we are informed that the fur lining of a cow's ear is sold at $10 a pound for use in coach painters' brushes.

In conclusion, it is pertinent to note that wool, the universal fur textile was purposely omitted, from our discussion for the same reason that human hair was omitted, namely—that each is deserving of special treatment.

Our one concern was to attempt to answer the question, What Fur? along the lines indicated. Our other concern is now for ourselves as well as for an audience, for with fur on the tongue and fur on the brain, the lecturer now "fur pity's sake" makes his audience happy with knowing that we have come to the end of this somewhat rambling presentation.

*Cases are on record where live wires falling upon the hatted heads of workmen did no damage because of the protection afforded by the fur felt. In one case 80,000 volts are said to have been stopped by a fur felt hat.

ACKNOWLEDGMENT

The author acknowledges his indebtedness to the National Association of the Fur Industry, New York, for permission to quote from their "Dictionary of Fur Names"; to the John B. Stetson Company of Philadelphia for affording laboratory facilities and to his assistant, P. P. Ramanuskas, B. Sc., for the splendid work done in connection with the photography of fur fibers, etc.

BIBLIOGRAPHY

While it is not customary with "popular" presentations of this nature, to append bibliographic references, exception is taken in this instance and the following representative authorities are listed:

Tierhaare der Hutindustrie. Herbert Rosenthal.

Recent Studies of Hair Structure Relationships. Leon Augustus Hausman. (*Science Monthly*, March, 1930.)

Dictionary of Fur Names. National Association of the Fur Industry, New York.

Fur Facts (1922). Albert M. Ahrens, St. Louis.

Successful Muskrat Farming (1927). Robert Hodgson. (*Fur Trade Journal of Canada*, Toronto.)

The Fur Trade of America (1921). Agnes C. Laut, New York.

The Fur Animals of Louisiana. S. C. Arthur. (Bulletin 18, Department of Conservation, New Orleans, State of Louisiana.)

The Fur Trade. Belden, N. Y.

Die Deutsche Woll- und Haarhutindustrie (1925). Rommler, Berlin.

Die Hutmacherkunst (1902). Leipzig.

PIONEER DRUG MILLING IN THE UNITED STATES*

By Joseph W. England, Ph. M.

THE ORIGIN of drug milling in the United States is rich in historic interest.

"The pioneer drug mill in this country, and perhaps in the world, was established in 1812 by Charles V. Hagner, at the Falls of Schuylkill, Philadelphia," according to Scharf and Westcott ("History of Philadelphia," Vol. III, 2234, 2277). "The idea of substituting machinery for mortar and pestle was suggested by a transaction between the proprietor and Dr. Haral (of Philadelphia), who had several tons of cream of tartar, which, under the old mode of hand-grinding, would have required the work of several men for many months. Hagner offered to grind by the same machinery which he used for grinting bark, plaster, ores, etc., and he did do it in twelve hours, to the great consternation of Dr. Haral, whose amazement and indignation were unbounded. He declared it had been ruined; that it was impossible in a single night to effect that which would have occupied his men months to accomplish. A meeting of the principal druggists and other experts was held at his office to consider the matter and the cream of tartar was examined and tested in various ways resulting in its being pronounced perfectly good, unusually white, and finer than any of them had seen before. The doctor was now well pleased, and, the affair becoming known, not only in Philadelphia, but also in New York, Boston, and other cities, the trade was completely revolutionized, and immense quantities of cream of tartar, Peruvian bark, ipecac, rhubarb, jalap, gentian, etc., were sent to the mills from all parts of the country."

The industry grew and developed. "In 1820 he (Charles V. Hagner) bought a water-power right at Manayunk—then called Flat Rock—a suburb of Philadelphia, of the Schuylkill Navigation Company and erected a mill adapted to the manufacture of oils and the powdering of drugs. In 1823, he added to his mills a fulling mill and caused to be made a number of power looms for weaving ratinets, which were the first power looms ever used in Pennsylvania for weaving woolen goods. Thus, he was, also, the pioneer in the introduction of looms, and his establishment became the birthplace of the vast woolen manufacturing industry which now sets forth its busy hum, not only along the banks of the Schuylkill, but throughout the

*Presented to Pennsylvania Pharmaceutical Association, June, 1931.

entire Keystone State. In 1838 his factories were burned down; he then left Manayunk, and in the following year removed to Philadelphia, where he took, for the purpose of his business, the old Lancasterian School Building (on Pegg Street), which he filled with every possible appliance for the grinding of heavy drugs." ("Roxborough, Wissahickon and Manayunk in 1891," published by George J. Kennedy of Wissahickon, 1891.)

In the AMERICAN JOURNAL OF PHARMACY for July, 1851, Charles V. Hagner contributed a comprehensive and exceedingly interesting article upon the subject of "Drug Grinding," evoked by a prior article on the same subject by Professor Theophilus Redwood, of London, in the January, 1849, issue of the same publication, giving drafts and description of the drug mills used in London in 1849 and earlier.

Mr. Hagner wrote: "My experience (in drug grinding) has at least been of some duration; I have been powdering drugs for this city, man and boy, thirty-nine years, having commenced it in 1812-13. One of my earliest attempts at grinding drugs was on a lot of cream of tartar, some 6000 pounds, for Dr. Haral, an extensive druggist of that day. He showed me the article ground, which was about the fineness of tolerable common table salt, the custom then being to pound it in mortars. He asked me if I could grind it. I told him I thought I could, much finer than the sample, and at a lower rate than he had previously paid (3 cents per lb.). I procured teams and hauled it to the Falls of Schuylkill, where I resided, and where my father had some mills. Being anxious to try the experiment, I commenced grinding it forthwith, about sundown, on a four feet pair of mill stones.* Finding it to grind easily and rapidly, I continued at it until it was finished, about the middle of the night. By nine o'clock next morning, I had it on the Doctor's pavement, much to his surprise and astonishment, and still more so when he examined the article and style of powder, which was altogether different from anything he had ever seen. He seemed to think that there was some enchantment or magic about it and would not believe, until he tested it in various ways, that it was his cream of tartar. After some time, however, he became perfectly convinced of the fact, and paid me liberally for the job.

*Millstone: "Either of two circular stones, often built up of several pieces, used for grinding grain or other substance; also, the material of which the stones are composed; buhrstone. Various stones of rough texture are used, especially cellular siliceous stones, and the grinding surfaces are dressed in a system of radiating furrows. The revolving stone, usually the upper, is called the *runner;* the other, which remains at rest, the *bed.*" (Webster.)

I had, I believe, all the cram of tartar to grind for six or eight years, when my method of grinding it became known to others, and only within two or three years past adopted in London. From Redwood's drafts and description of the drug mills in London, and from what I have heard from other sources, they seem to be unacquainted with the use of mill stones in drug grinding."

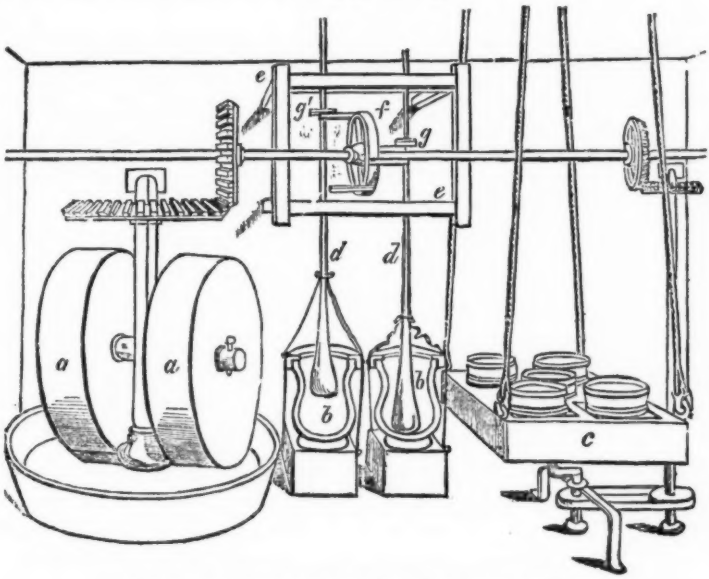


Fig. 1—Apparatus for Drug-Grinding (Circa 1840).
a a. The Drug Mill. b b. The Stampers. e e. The Guiding-Frame for Stampers.
c. The Sifting Apparatus.

In the *American Journal of Pharmacy* for January, 1849, Theophilus Redwood, Professor of Chemistry and Pharmacy to the Pharmaceutical Society, published an article "On Drug-Grinding," as practiced in Great Britain 82 years ago. He wrote: "The drug grinder reduces drugs to powder, in some cases, by *contusion* with a pestle and mortar called a stamping-mill or stamper. The pestle, weighing 30 to 40 to 60 pounds, is raised by machinery, and allowed to fall with the impetus of its own weight, as shown at d e f g. The drug grinder* also reduces drugs to powder by *trituration,* and this is the principal mode of operating adopted at the drug mills. The triturating implement of the drug grinder is usually called the drug mill. It consists of two stone cylinders (a a) commonly called the runners, four or five feet in diameter, and 12 or 15 inches in thickness, which are trundled round a central beam working on a

*The drug grinder described by Redwood was evidently a chaser mill, which triturates and powders, but does not grind and powder like the buhrstone mill.

spindle. The runners, which are made of granite or other hard stone, and usually weigh a ton or more, break down or tear the hardest and toughest substances, partly by weight of the stone, and partly by the grinding or triturating action produced in consequence of the outer and inner edges of the revolving cylinder, which are both equal, being made to perform unequal circuits in the same time.

"A drug grinding room usually contains a pair of stones (a a), a set of five or six stampers such as b b, and a sifting apparatus (c) consisting of a square wooden frame in which there are five or six octagon-shaped holes for the reception of the sieves. This frame is suspended from the ceiling by four ropes or chains, and its peculiar motion is effected by a rotating crank working in a socket in the bottom of the frame. The sieves employed in the process are the common drum sieves.

"The drying of drugs (prior to the grinding) is generally effected (after being cut or broken into small pieces) in a room heated to about 120 degrees, by means of a stove or steam pipe."

Mr. Hagner then described at length the character and extent of his drug grinding experience, and the practical difficulties encountered, through many years. He referred to the common and extensive adulteration of the day in ground and powdered drugs, and the great change that had and was still taking place in the qualities of drugs, stating that: "In regard to the qualities of drugs that pass through my hands, there was undoubtedly a very great change—I might, perhaps, say, revolution upon the institution of the Philadelphia College of Pharmacy. I remember it well. I was in full operation at the time, and had good opportunities of seeing the effect produced; and ever since that time the large bulk of drugs I had to do with are far superior to what they had previously been. The institution of the College was about the same period as the introduction of quinine into general use." *

Mr. Hagner states that in 1812 his competitors of that day were John Price, a perfectly dependable and honest man in his business, and an individual named Jack West. They operated with rude horse-power mills and quite primitive apparatus; but he did not state what form of power he used. It seems probable, however, that it was

*The first manufacture of quinine sulphate in the United States was by Farr and Kunzi (later Powers and Weightman) of Philadelphia, in 1823, soon after Pelletier and Caventou had made known the results of their experiments in 1820." ("The American Manufacture of Quinine Sulphate," by Joseph W. England in "Alumni Report of the Philadelphia College of Pharmacy," March, 1898; and *The American Journal of Pharmacy*, December, 1930.) The College was organized on February 23, 1821.

steam power. The first steam engine of any size appears to have been introduced into America in 1763. (Its parts were imported from England.) In an article entitled "Notice of the Earliest Steam Engines Used in the United States," by Frederick Graff, Esq., Superintendent of Philadelphia Water Works (*Journal of the Franklin Institute* of the State of Pennsylvania, 1853, 269), there is given a review of the few steam engines used in this country in the year 1801, with a description of those erected and started in that year at Centre Square and Schuylkill Water Works, believed to have been the first stationary engines of any considerable size used in the City of Philadelphia, and probably the first engines of such large dimensions manufactured in this country.

It is of interest to trace the life history of this pioneer, as follows:

"Charles Valerius Hagner, manufacturer, was born in Philadelphia, January 13, 1796, being the son of Philip Hagner and the grandson of Frederick Hagner, who emigrated to the United States from Germany in 1745. Both his father and grandfather were prominent citizens of Philadelphia, and served as commissioned officers in the Revolutionary War. Charles V. Hagner received his education at the University of Pennsylvania, and commenced life as a clerk in a merchant's office. After about a year spent in this position, he entered his father's mills at the Falls of Schuylkill, and remained there in a subordinate capacity until 1817, in which year his father retired, and he assumed the absolute control of the business.

"In addition to his prominence as an enterprising merchant, he became noteworthy for public spirit, and for his exertions for the welfare of the community. He it was who established the first post office at Manayunk, and kept it running for several years by his own individual efforts. He was commissioned by Governor Wolfe as a magistrate of Manayunk, and it was through him that the first stage was run between Manayunk and (the city of) Philadelphia. In 1832, during the cholera epidemic, he exerted himself manfully for the sufferers. He was conspicuous among the schools of the State, and did much to increase their efficiency. He made his mark in his generation, and in common with many successful men, attributed no small share of his success to the powerful influence for good exerted upon him in his youthful days by his mother. He died in 1877, on Mount Vernon Street, Philadelphia." ("Roxborough, Wissahickon and Manayunk in 1891.")

Charles V. Hagner was the author of "The Early History of the Falls of Schuylkill, Manayunk, Schuylkill and Lehigh Navigation Companies, Fairmount Waterworks, etc," an interesting record of the men and customs of bygone days. It was issued from the press of Claxton, Remsen and Haffelfinger of Philadelphia, and a copy is in the archives of the Historical Society of Pennsylvania, presented and signed by its author.

In "Roxborough, Wissahickon and Manayunk in 1891," written by George J. Kennedy of Wissahickon, and printed by Clarence Jacoby, the title-page gives this quotation from Carlyle: "There is no life of a man faithfully recorded but is an heroic poem."

And the life of the Hagner Family was "an heroic poem." A few months ago (February 22, 1931), Miss Mary Hagner, aged eighty-three, the last surviving member of this old Philadelphia Family, died at her residence, 626 East Shawmont Avenue, Roxborough, and was buried in old Laurel Hill Cemetery.

Miss Hagner was descended from one of the families which settled Germantown during the first half of the Eighteenth Century, and was a granddaughter of Colonel Philip Hagner, sub-lieutenant of Philadelphia during the Revolutionary War. It was Colonel Hagner who removed the bells of Christ Church to Bethlehem to prevent their being seized by the British and melted down. Philip M. Hagner, her father, was one of the delegates from Pennsylvania who nominated Thomas Jefferson for President. Charles V. Hagner, her uncle, was a captain in the American Army during the War of 1812. Reduced almost to poverty by the defalcation of a trust officer who managed her estate, Miss Hagner lived for fifteen years in a room at the Shawmont Avenue address, seldom leaving the house.

From the wreckage of her family fortunes, she saved a number of books and relics which she later divided among the Historical Society of Pennsylvania, which preserves the Revolutionary uniform and sword of Colonel Philip Hagner; Memorial Hall, University of Pennsylvania, and Pennsburg Academy, to which was sent old German books brought by the Hagner Family when it immigrated to the colonies.

Her cousin, Thomas Hagner, died in poverty at Third and Callowhill Streets fourteen years ago. He also left behind a number of historic relics.

The writer has received the following most interesting communication:

THE WELLCOME HISTORIAL MEDICAL MUSEUM
(The Wellcome Foundation, Ltd.)
COLLECTIONS
Illustrating the History of Medicine and Allied Sciences Throughout the World From Prehistoric Times

Henry S. Wellcome, LL.D., F. S. A.
Director
L. W. G. Malcolm, M. Sc., F. R. S. E.
Conservator

54, Wigmore St.
Cavendish Square
London, W. I.
9th June, 1931.

Dear Mr. England,

I am forwarding to you by this mail a photograph of the Drug Mill of the Society of Apothecaries of London, which was in use in 1788. As you know, the material from the Physic Garden at Chelsea was sent to the Society of Apothecaries, and there is not the slightest doubt that many of the earlier drugs of the Society were prepared in this mill. As far as I am able to learn it used to stand near the banks of the Thames. I will try and get more information for you, but the facts which are certain are that it was being used in 1788 and was erected at a much earlier date.

With kind regards,

Yours sincerely,
(Sgd.) L. W. G. Malcolm,
Conservator.

J. W. England, Esq.,
Smith, Kline & French Laboratories,
Delaware Ave. and Poplar St.,
Philadelphia, Pa.

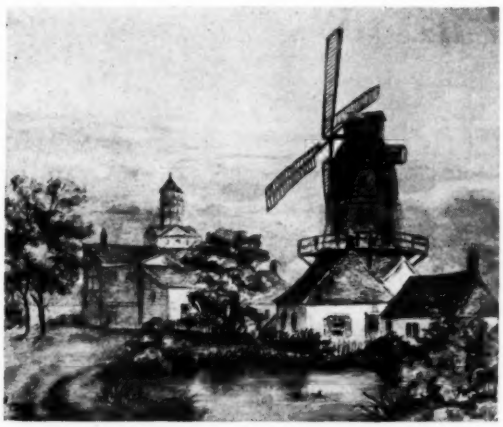


Fig. 2—Drug Mill of Society of Apothecaries of London (Used Circa 1788).

Modern Grinding is described as follows by Drug Markets Catalog and Directory, 1931, 30A:

"Grinding is the process of reducing solids. Although there are a multitude of machines for performing the various phases of grinding, the operation itself may be divided into four major phases; namely, crushing, shredding, pulverizing and milling. Milling is again divisible into two phases, dry milling and wet milling. Crushing is the first step and, of course, implies coarse, dry grinding. Shredding implies a tearing or chopping action and is generally employed in the reduction of fibrous materials. Pulverizing means fine, dry grinding, invariably at high speed.

"Milling, either wet or dry means extremely fine reduction, generally by a process of attrition. It must be remembered that all grinding is random grinding, in that the particle size cannot be controlled absolutely, a percentage of variation, usually 15 or 20 from a given mesh, being standard. The selection of a grinder depends upon a number of factors, such as speed and capacity, and the nature of the solid to be reduced. Many drugs, if they are oily or resinous, are injured very materially by heating in the grinding process, a factor which must be safeguarded against by using water cooled grinders. When it is desired to produce a material of a given mesh, it is necessary to separate by sifting, or in the case of wet milling, by settling or levigation. Impalpable talc, chalk and kaolin are produced by wet milling and settling in a series of tanks into which the liquid is allowed to flow in such a manner that the coarser particles settle out first and the finer product is carried over in the turbid liquid to the last tank where it is permitted to stand until settled out and is then dried."

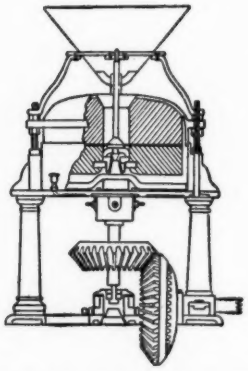


Fig. 3—Munson's Under Runner Buhrstone Mill.

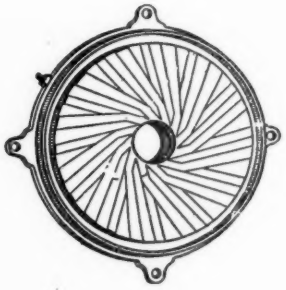
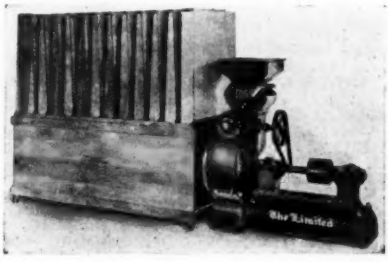


Fig. 4—Buhrstone.

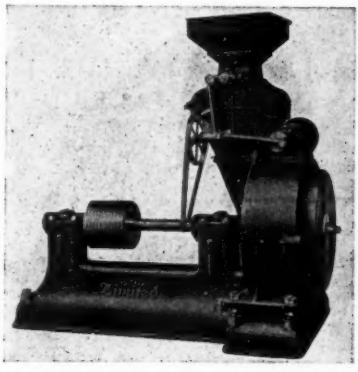
The buhrstone mill which has been extensively employed in drug milling (and now being rapidly superseded by the modern high speed mill) is illustrated in Remington's Practice of Pharmacy (Cook and LaWall) (1926, 159), as follows:



Courtesy of Schutz-O'Neill Co.

Fig. 5—The Limited Mill With Receiver Box.

The usual method adopted by the majority of spice and drug millers is simply to use the mill with its plain receiver box as shown above. The box is large enough to hold a half day's grind of most material. The box is on rollers so that when full it may be wheeled away from the mill if necessary. Its zig-zag, or dust top, is cloth covered to allow exhaust of air pressure from mill, while retaining the ground product. This is the oldest method and is the simplest and best for the smaller size machines for work on spices, drugs, cocoa powder and some of the chemical products.



Courtesy of Schutz-O'Neill Co.

Fig. 6—Limited Pulverizer With Vibrator Feeder.

Made in all sizes and especially adapted for work on broken, or cracked roots, barks, crystals, seeds, sugar, salt, nitrate of soda, composition stock, milk powder, saltpetre, chemicals, and the softer earthy substances.

The Vibrator Feeder handles stock broken down to about corn size or smaller.

A very handy, light running and easily managed mill, strikingly well adapted for the duty of pulverizing very many sorts of material. Its feeder vibrates from side to side, fast or slow, as its hand lever is set by the operator.

The doors at the ends of the feeder frame may be opened for examination of the stock, or of the quantity going down to mill's grinding chamber.

Its Tailings Valve Cover is readily removed for cleaning the tailings chamber. Four small oil rings around the shaft prevent leakage or waste of oil from the bearings; and the mill case itself is placed on movable screws by which it may be raised or lowered, as required to keep the shaft centered in its grinding chamber.

The smaller sizes are fitted with Receiver Box to take the ground product; for the large sizes special receivers are made.

Various other forms of milling machinery are used, such as the roller, pebble, ball, tube and jar mills, disintegrators, rotary cutters, mixers and sifters, etc.

Among the older drug millers of the United States are:

Peek and Velsor, Inc., of New York, founded in 1840.

McIlvaine Brothers, Inc., of Philadelphia, founded by Thomas Matlack in 1844, and called for many years "The United States Drug Mills." Mr. Matlack was succeeded by his nephew, A. Robinson McIlvaine, in 1864, who founded with Henry McIlvaine, his brother, in 1870, the firm of McIlvaine Brothers.

R. Hillier's Son Corporation, of New York, founded in 1860.

The Huber-Fuhrman, of Fond-du-Lac, Wisconsin; later The McLaughlin-Gormley-King Company, of Minneapolis, founded since 1862.

Murray Michell Manufacturing Company, of Chicago, founded in 1865.

Allaire, Woodward & Co., of Peoria, Ill., founded in 1873.

The Philadelphia Drug Mills, founded by W. S. McKinley in 1884.

The J. L. Hopkins & Co., of New York, founded in 1890.

S. B. Penick & Co., of New York, founded in 1911 at Asheville, N. C.

As Tennyson wrote in "The Passing of Arthur": "The old order changeth, giving place to the new." And so we may say the windmill power, the horse power, the water power, the steam power, for the grinding of drugs, have all given place to electricity, or steam and electricity. In addition, steam boilers are used for the vacuum stills and oven operations. The most modern drug mills have full electrical equipment, including an electrically controlled kiln or drying room. The heat, as well as power, is supplied through electricity.

COMMENCEMENT DAY ADDRESS TO THE GRADUATES OF THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE*

By Walter A. Bastedo, Ph. G., M. D., Sc. D.

IN A TINY BOOK called "A Way of Life" that great physician, Sir William Osler, translates the expression, "Life is just one damn thing after another," into the words, "Life is a habit," *i. e.*, almost everything we do is more or less automatic. Only with persistence and great difficulty do we learn to walk, to read, to add and subtract, to catch a ball, etc., but after a time we do these things automatically. In other words they become habits. Thus by repetition we eventually establish modes of thought and action which become second nature and a part of ourselves. As Aristotle said: "We are what we repeatedly do; but in our habits we are *only masters of the beginning,* their growth by gradual stages is imperceptible."

It is in this formation of habits that we so differ. We cannot change the gifts that God has given us, but by our habits we can often modify their manifestations to a marked degree. If we do not begin right in acquiring a good habit we may develop its opposite: work or laziness, the hard road or the easy one, thought or lack of it, ambition or contentment with things as they are, courage or supineness, these habits make the difference between the efficient and the mediocre.

You graduates have just finished a long and arduous process of education and, unconsciously to yourselves, have been acquiring habits, the habit of doing things well, the habit of learning from books, the habit of remembering, the habit of thinking things out for yourselves, the habit of working hard. I trust that these habits will last throughout your lives, for you as the younger generation have many things to do.

Through the courtesy of your learned faculty, I am commissioned and privileged to deliver a sermon to you tonight on some appropriate subject: "How to be happy though married," "How to be successful though honest" or some similar ethical theme. But, lacking forensic gifts, how can *I* be expected to sermonize acceptably a group of graduating—and budding—pharmacists? I undertake the duty for one reason only—I was once a graduating pharmacist myself. The

*June, 1931.

Standard Dictionary says that a pharmacist is a pharmaceutist or pharmacopolist; therefore, in your exit from the eggs, the college eggs, in which you have been incubating these several years, I rejoice that to me is given the privilege of welcoming you as fledgling pharmacopolists.

It is a pleasing spectacle and one that fills us with hope, to see so many of Eve's daughters among you graduates. In my pharmacy class there was but one poor lone woman. Soon it may be that Cupid will wage a war with Pharmacy concerning you. He is a tiny naïve creature, but he has a way of winning his battles. Some of you will marry pharmacists, and will prove professional helpmates to your husbands—or your husbands will be your professional helpmates. Wise will they be when they take you into their counsel. Some of you will change your ambition completely to that of raising a hero or genius of the next generation. Others of you will be wedded to your chosen profession, and will in time become its contributors, teachers or leaders. Whatever transpires, who would gainsay the statement that today's education of a pharmacist is a superior education, and one that is suited for woman, as well as man, in any sphere?

This day is Diploma Day. To quote Sir James Paget, "a diploma, obtained by hard examinations and hard cash and signed and sealed by earthly examiners, is not a heavenly document; but it places on each of you who possesses it a heavenly responsibility." For at the moment you are the educated of your profession; in time to come some of you will be its "gebildete Männer." You are now in possession of more technical learning than was ever possessed by any of your great men of the past, those who worked and thought and paved the way for you, without an inkling of many of the things which to you are commonplaces. Your education has been liberal, for not only have you been instructed in the technical, you have in addition been made aware of the value of knowledge as such. What would civilization do if the practical only were to absorb all minds? Much of that which we now utilize has been discovered by quiet workers in pure science who have sought knowledge alone without a thought of its practical application. I am sure that from none of *you* would come the answer of the business man who, when told that there was iron in the sun, replied, "Well, what's the use of knowing that, there is no way of transporting it." On the other hand, I should not expect to find any of you among the intelligentsia, who are described by Dr.

Shoemaker as "those people who have been educated beyond their intelligence."

For three years experts in every line have been teaching you the latest news and the most up-to-date facts in the several departments of your studies. Your presence here is an indication that you have not been stuffed like the Strasbourg geese to make your livers fat. On the contrary you give evidence that the intellectual food handed to you has been assimilated and has produced the desired effect upon your gray matter; for in all departments you have passed rigid examinations, such as would stump most of your elders, especially myself. But now for awhile you have had enough of education, that is, education spelled with a capital E and put in quotation marks. I haven't a doubt that at this very moment most of you feel like a certain young man who, after graduation from Princeton two years ago, came to me and said, "Dad, I never want to open another book as long as I live." After a vacation and two months in a bank, where his brains had a rest, he volunteered, "Dad, I want to study law." He is now studying as he never did before. The moral of this is: When the machine has done its work stop and oil it up. The best oil for the human machine is a vacation. Right now you have been overworking your mental machinery, and should have the good vacation you deserve. But also throughout your lives when you are depressed and tired of it all and the spirit has gone stale, or when you feel like quarrelling with your neighbor, take a vacation. It is the best remedy in the world to restore efficiency, right thinking and pep. Perhaps vacations will be more available to you if the older men will acquire the habit of taking the younger into partnership earlier in their lives, a proposition that is likely to work both ways for good.

Of course you cannot continue to excel in all the subjects that you have studied, for you cannot use all your knowledge all the time, and to fail to use technical knowledge is to lose expertness in it. In some of you there exists that compelling urge for proficiency which means specialization, *i. e.,* beginning by knowing something about everything in your profession, you will end by knowing everything about something in it. And so will you be experts and make your mark in the world. But forget what you will of what you have learned here you can never lose the influence of knowledge once gained in broadening your viewpoint.

This one will excel in the art of pharmacy, that one in chemistry or in botany or in materia medica. Some will be teachers and leaders

of pharmaceutical thought, and some of you will head great manufacturing or wholesale houses and will make a lot of money. May I predict that of your money you will apply a proper share to the furtherance of the pharmaceutical education of the future.

Let me adjure you to lose no time in becoming a part of your local pharmaceutical branch. In due course also join the American Pharmaceutical Association and such other societies as may especially interest you. For these not only furnish contacts with your professional brethren, keep you abreast of the progress in your vocation, and furnish you the opportunity to express your views to discussion and criticism, which are wholesome; but they also make you a part of the group who are working to maintain and improve the ideals and the status of your profession. There is an old saying that interest does not bind men together, but rather separates them; there is only one thing that can effectively bind people, and that is, a common devotion. And this is developed in the great professional societies.

You are at the brink of the larger relation of the pharmacist with physicians and the public. As you use your skill and knowledge for their benefit, so will you reap material and spiritual rewards. Let me beg of you to make special efforts to be friendly with your neighboring physicians, for your interests and theirs are close together. If there were any truth in the slogan, "An apple a day keeps the doctor away," it might be good for the apple grower, but where would the doctor and the pharmacist come in? We are fellow professionals, the one dependent upon the other.

If we may borrow from Dr. Jastrow, a profession is an occupation in which one works along lines that tend to abolish one's own job. A clergyman, for example, has the job of saving souls, and when all souls are saved, what need of his services further. Judges—I wouldn't say lawyers—are doing what they can to improve conduct, and when the judges have us all either well behaved or in jail, they will no longer be required. The physician and the pharmacist work together to abolish sickness in their customers, and as these cease to need the help of the materia medica, they will cease to need us.

How important in the humanities is his work as a professional man or woman the pharmacist probably does not always realize! Not only is he an essential instrument in saving life and the lessening of bodily suffering; but also, if his drugs are such that they mean fewer days of illness, he is helping the wage earner to return more quickly to the position of providing for his family; he is helping in

the rapid return of the mother to the needed care of her temporarily motherless children; he is helping in the early relief from poignant anxiety of the mother, father, wife or husband, worn out by the strain of a serious illness in a loved one. In the last analysis these things may depend upon *your* scrupulousness as to the quality of your drugs, *your* accuracy in compounding prescriptions. Happy the physician when, in an uphill fight against the demon disease, he can say: "Though I am an unworthy fighter, thank God my weapons can be relied upon." Thus are pharmacists and physicians wedded together for the benefit of humanity. And while, like other wedded couples, we may have our fault-finding moments, better acquaintance should lead us to be considerate, each of the other.

The pharmacist finds fault with the physician's use of the ready-mades, his resentment of suggestions, his carelessness about his prescriptions. They are just grounds of complaint. The physician in turn displays a husbandly grouch over the character of the present day drug store. It is said that a physician is always under the strain of appearing wiser than he is; today on account of the trade drug store the good pharmacist is under the strain of appearing less wise than he is. This must not be. At the present time we physicians are puzzled to know which of our neighboring druggists we shall greet with courtesy and respect as fellow professional men. So we ask you who have expended time and money on the higher education in pharmacy, and by this signify your belief in it, to see to it that definite and unmistakable criteria are established by which we may with readiness distinguish you from the mere traders. In the mind of the physician all the non-professional functions usurped by the pharmacist are deterrents to professional service. We look forward to the time when there will be no pharmacies except those with a professional atmosphere, those which are presided over by pharmacists who know pharmacy and are proud of it. For your success we might almost wish for you a return of conditions in the middle of the eighteenth century, when Dr. Dover of pulv. ipecac et opii, stated that for a fever case in an ordinary family sixty pounds was the average expenditure for drugs alone.

What joy it gives a physician, on visiting a pharmacy, to have the proprietor or clerk welcome him as a friend, invite him behind the counter and talk over the best way of prescribing this, that or the other, how best to combine this and that in the same mixture, or how to make it palatable. A physician visits such a store with pleasure

and looks forward to a repetition of his visit. The pharmacist also enjoys it, and each has a greater respect and friendliness for the other. When from his busy life a physician takes the time to drop into a pharmacy to ask questions, the pharmacist has won a friend.

As in all vocations, it will be your lot to wage certain fights for desirable improvements in your professional lot. Progress has been made by your predecessors, and in recent years largely through the colleges sending out "graduates who have had mental training sufficient to enable them to judge between the excellent and the inferior, the sound and the unsound, the true and the half-true." But further progress must be made against the heavily vested interests that oppose it. In any case, whether the controversies involve your own occupation or not, you as citizens must give your influence to progress.

To the old fogey any suggestion of change is appalling. Harvey, the discoverer of the circulation of the blood, complained in his day that few men over forty seemed able to accept the new doctrine. It may be that a revolution is pending, and revolutions are not made by gray-haired men who pant when they climb a flight of stairs. New ideas must build their nests in youthful brains. You have the most recent and most complete education that graduating pharmacists have ever had; your senses are quicker than those of your elders; you have youth which is hopeful and venturesome; you have courage to expel the old and replace it with the new. At twenty-seven, Napoleon was given command of the Italian army and at thirty-six was Emperor of France. Thomas Jefferson was thirty-three when he drafted the Declaration of Independence.

Disraeli said: "We live in an age when to be young and to be indifferent can be no longer synonymous; the youth of a nation are the trustees of posterity." We older ones can only look or appear wise, and suggest; you can act, and the effect of action is more potent than the effect of speech. I am quite consistent in calling upon youth, for in all ages the elders have realized how badly muddled they are leaving things; in all ages they have passed the buck to youth.

Fichte's creed was: that in the making of a man power is born by opposition, that struggle begets strength, that resistance provokes vigor of mind and of spirit, and that the very obstacles to progress make progress possible. We can subscribe to this creed. Obviously the line of least resistance can never be the line of development.

Therefore, educated youths, come forward with your ideas, and your manly vigor! We look to you to bring about the changes for

the better that are so sorely needed. You must be the ones to fight the battles that are to make pharmacy safe for pharmacists. Otherwise, we might say with Teiresias, "Alas, how poor is wisdom when it profits not the wise!" Allow nothing to discourage you. We all are handed lemons at some time in our lives, but while some are content to suck the lemons and make a wry face, others get busy and turn them into a creamy lemon pie. Psychologic experiments tell us that if you believe you can't, your power may be decreased as much as two-thirds; if you believe you can, it may be increased considerably.

But only a few of you can be the leaders in any progressive movement; the rest must give these their support. An army is made up of its generals who plan, its captains who lead, and its privates who follow into the fight. All are necessary to its success. Those of you who are good privates will see to it that you are on the right side and where the fighting is.

In France there was a southern darkey who was badly scared with the shells bursting all around him. Panic-stricken, he ran for all he was worth back behind the lines. After a time he came full tilt into an officer's stomach and, when he gathered his wits together, blurted out, " 'Scuse me, capen." The officer said, "I am not a captain, I am a general," and the negro said, "Foh de Lawd's sake, ah mus' have run a long distance from the fightin'!"

I once listened to Mr. Andrew Carnegie, who gave so much of his money in the cause of peace. He was speaking at a peace meeting, and he said, "If I hear anyone say a word against peace, I'll take off my coat and give him the worst licking he ever had." That was *his* way to get peace, fight for it. But when we speak of fighting pharmaceutical battles we mean, not with the weapons of an army, but with brains and persistence. Mere expression of a desire will do no good. We must develop a workable plan, must shout it so that everyone will hear; must convince so that everyone will heed. Many conquests, and the most satisfactory ones, are made by the use of intelligence rather than fists.

Having addressed myself so much to certain of the militant among you, I want now to address another special few of you, those who are competent but diffident, those whose confidence in themselves is undeveloped. The rest of you need not listen. Some of our greatest men have been humble and retiring by nature, and for long years have been unconscious of their real worth in the world. I have had the friendship of several such who have passed away,

and among them, two who began life as pharmacists, Dr. Charles Rice, of New York, and Sir James Mackenzie, of England. Dr. Rice came from Germany at the age of twenty-one, entered the United States Navy as hospital steward, worked up to become apothecary at Bellevue Hospital, and finally became chemist to the Department of Charities and Correction of New York City. In addition to his daily grind, he was a most influential factor in the American Pharmaceutical Association, in the Revision Committee of the U. S. P., of which he became chairman, and in the development of the New York College of Pharmacy. He became a member of many American and foreign societies, was familiar with some sixteen languages, and was a leading authority on Sanskrit. In recognition of his scholarly attainments the University of the City of New York conferred upon him the degree of Doctor of Philosophy, and the Philadelphia College of Pharmacy that of Master in Pharmacy, and he was honored among pharmacists in all countries. While at the New York College of Pharmacy I won a little prize, so I went to Dr. Rice, who was chairman of the Examination Committee, and thanked him for his goodness in awarding the prize to me. I shall never forget how hurt he seemed at my implication that he might grant an honor for friendship's sake rather than for merit. He was the most humble and unassuming of men, wanted nothing for himself, and as Dr. Wimmer writes: "Of a singularly modest disposition, devotion to duty was Dr. Rice's most strongly marked characteristic."

Mackenzie was a Scotch boy who did a lot of thinking but never could memorize or shine in recitation, so that his teachers dubbed him "dunce." One night on his way from school he became deeply impressed with the brilliance of the colored lights of a chemist's window, red, yellow and green, and set about at once entering pharmacy. So for some years he underwent what he called the wholesome discipline of the routine and monotony of the drug store apprentice of the period, washing bottles and windows, mixing great mortars full of the nauseating doses of the day, boiling decoctions and beating up blue ointment and other messes. His salary was five pounds a year. In due course he was offered a partnership in the business, but having acquired a taste for study, entered a school of medicine. After graduation he wrote: "I had great difficulty in passing my examinations," and again, "My very moderate attainments precluded me from obtaining any of the coveted posts about the university, and I quite clearly recognized that I was only suited for what is considered the

lowest place in the medical profession." He began in a colliery practice at two pounds a week and his board, and later practiced in Burnley, a mining town where the inhabitants went to work in wooden clogs and paid him a shilling a visit. His biographer says of him: "His humble spirit accepted the low estimate of his abilities which some of his teachers appear to have formed." "His chief weakness was lack of assurance in his own power." Yet this modest man, this dunce, after receiving his early discipline in the training of a pharmacy apprentice, revolutionized our knowledge of cardiac physiology, became a great London consultant, was knighted by the King of England and was honored the world over.

The degree of confidence in oneself is not a measure of one's intelligence, and has no necessary relation to one's attainments. So I say to you who are modest and diffident, be not discouraged but work along, not for glory or for gain, but for the work itself. The hidden talents in you may be better than some that are visible, and the stone that has been rejected may become the head of the corner.

To all you graduates it is scarcely necessary for me to urge you "with labors assiduous due pleasures to mix." Have your recreation periods, meet others outside of the business, and travel when you can, for "home keeping youth have ever homely wits." I have been much instructed by talking with pharmacists in various parts of Europe, the United States and Canada. The knowledge of how others think and live is necessary if you would be wise; social relations are requisite if you would have a balanced judgment and retain your sense of humor.

On the other hand, those who are especially capable in the intellectual lines of research must restrict the social leanings, scorn delights and live laborious, for:

"The heights by great men reached and kept
Were not attained by sudden flight
But they, while their companions slept
Were toiling upward in the night."

Through the years Philadelphia has been the home of such toilers, men of greatness in pharmacy. It has been largely the seat of the birth and life of the Pharmacopœia, and your college, the pioneer of pharmacy colleges in the United States, has furnished not only many workers, but the leaders in the sundry pharmacopœial revisions from the earliest time.

A pivotal position that requires a combination of many sterling qualities is the chairmanship of the Revision Committee of the Pharmacopœia. It was held by Professor Remington, then by your Professor La Wall. It is now ably held by another of your teachers, Professor Cook.

I must congratulate you on your privilege of working in this beautiful and well-equipped college building. Good tools are good things for a good workman to have. As Durant says: For lack of a telescope Aristotle's astronomy is a childish romance; for lack of a microscope his biology wanders endlessly astray. Yet after all, "The vital element in any college lies in the men who work in its halls, and in the ideals which they cherish and teach."

You graduates of this college have a legacy of great worth. You inherit the traditions of a noble family of workers. You are the heirs of George B. Wood, of Franklin Bache, of Maisch, Remington, Sadtler, Beringer, Kraemer and a host of others whose names are to conjure with. "It would be a sorry day were the great men of the past to be held in light esteem. It is in their continual remembrance that one finds one's highest inspiration." With your heritage it is impossible that you fail to carry on; you cannot be renegades. Therefore, whether you will it or not, must you be the idealists, the workers, the builders, yes, and the fighters for the betterment of that profession you have chosen for yours.

"Excellent courage our fathers bore—
Excellent heart had our fathers of old;
None too learned, but nobly bold
Into the fight went our fathers of old."

Graduates, I congratulate you.

THE ONE HUNDRED AND NINTH ANNUAL COMMENCEMENT OF THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.

The annual baccalaureate services preceding the 109th commencement of the College were held Sunday, June 7, at Walnut Street Presbyterian Church, Fortieth and Walnut Streets. The baccalaureate sermon was preached by the Reverend Dr. John Archibald MacCallum.

Millicent R. LaWall.

The graduating class met at the College at 3 P. M. and marched in academic costume to the church, where they were met by the Faculty.

On Alumni Day, Tuesday, June 9, alumni gathered from far and near to meet classmates, friends and faculty members of the College. Reunions of alumni have been an annual feature at the Philadelphia College since 1824, 107 years ago. Reunion luncheons and dinners, special features and entertainment were planned by the classes which had graduated in the years ending in 1 and 6 because this marked the fifth, tenth or later anniversary of their graduation.

The program for Alumni Day began with a baseball game between the alumni and 1931 graduates. Age and experience had its fling and the alumni won the game due in large part, however, to their scoring three runs in the ninth inning.

Following this came the annual meeting of the Alumni Association, at which the following officers were elected:

President: Mrs. Millicent R. LaWall, '04.
First Vice-President: Quintus Hoch, '99.
Second Vice-President: Joseph W. E. Harrison, '17.
Recording Secretary: Joseph W. England, '83.
Corresponding Secretary: Frank N. Moerk, '13.
Treasurer: Brua C. Goodhart, '07.

Ivy planting and placque placing were conducted outdoors on the College grounds. Aaron Lauter of Stonehurst, Pennsylvania, presented the placque and ivy on behalf of the 1931 graduating class. Carl Riley of Easton, Pennsylvania, then delivered the ivy day oration for his class. The placque and ivy were accepted by President Wilmer Krusen, with appropriate remarks in the presence of the graduating class and a large group of visiting alumni. The presentation of the mural paintings referred to elsewhere in this issue was the next feature.

Reunion dinners followed among the hundreds of classmates assembled for this Philadelphia College Alumni Day.

As a feature of the evening program the graduating class presented dramatic sketches and instrumental and vocal selections. The Pharmasingers, women students' choral society, occupied a prominent place on this program. A surprise feature of their part of the entertainment was the presentation of an oriental baton to the founder and leader of the organization, Mrs. Charles H. LaWall, 1904 graduate and incoming president of the Philadelphia College Alumni Association.

Semi-centennial awards were presented to the members of the class of 1881 who were at their Alma Mater celebrating the fiftieth anniversary of their graduation.

The 109th annual commencement was held in the College auditorium at 8 P. M., on Wednesday, June 10, in the presence of an audience which filled the auditorium to capacity.

The invocation was pronounced by the Reverend Dr. James Ramsay Swain, pastor of the Woodland Presbyterian Church, Philadelphia. The candidates for graduation were presented to President Wilmer Krusen by Dean of Science Julius W. Sturmer and Dean of Pharmacy Charles H. LaWall. Decrees in course in pharmacy, chemistry, bacteriology and pharmacognosy were conferred upon 193 students.

In addition, the degrees of Master of Pharmacy (honoris causa) were received by the following: Henry Brown, well-known retail druggist of Scranton, Pennsylvania, seven members of whose family are pharmacists. He is first vice-president of the Pennsylvania Pharmaceutical Association and long has been active in pharmaceutical organization affairs.

Howard E. Gensler, of Harrisburg, Pennsylvania, a graduate of 1912, for 18 years associated with the Bureau of Chemistry of the Pennsylvania Department of Agriculture, in recognition of his distin-

guished contributions to the microscopy of feeds and fertilizers. Dr. Gensler has originated so many new methods of detecting adulterations in feedstuffs that Pennsylvania today is regarded by other states to be in the forefront in this type of work.

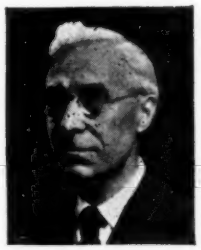
Robert Glenk, of New Orleans, Louisiana, P. C. P. & S. graduate of 1891, who thus celebrated also the 40th anniversary of his graduation. For 26 years he has been curator in charge of the Louisiana State Museum and has served the State of Louisiana as its commissioner at all important national expositions in the past 30 years. As a result of his able and untiring efforts, the Louisiana State Museum has been made the center of nearly all scientific and civic activities of New Orleans.

Julius H. Riemenschneider, of Chicago, Illinois, president of the N. A. R. D. and long active in its affairs, as well as in the Illinois Pharmaceutical Association and the Chicago Retail Druggists' Association. For 28 years he has operated a highly successful professional drug store at 2916 Broadway in Chicago.

RECEIVE HONORARY DEGREES

Henry Brown

Howard E. Gensler



Robert Glenk

Julius H. Riemenschneider

The address to the graduates was delivered by Dr. Walter A. Bastedo,* president of the United States Pharmacopœial Convention, who is a graduate of Columbia University's College of Pharmacy and its College of Physicians and Surgeons, and is internationally known in both professions. He spoke in happy vein of the necessity of pharmacists and physicians of the present and future co-operating to the fullest extent in their joint responsibilities. President Krusen delivered a farewell message to the graduating class. Degrees in course and certificates were awarded as follows:

*Printed elsewhere in the Journal.

MASTER OF SCIENCE IN CHEMISTRY

Herbert Bohn
Frank N. Moerk

MASTER OF SCIENCE IN PHARMACY

Chimanlal B. Shah

MASTER OF SCIENCE IN BACTERIOLOGY

Ralph Pressman

BACHELOR OF SCIENCE IN CHEMISTRY

Carroll W. Cole
Charles L. Cump
Albert F. Deuble
Harold H. Fisher
Jacob Gelb
Charles K. Goss
Roy O. Metzler
E. F. Nunemacher, Jr.
Pauline E. Prenzel
Manuel Tubis

BACHELOR OF SCIENCE IN PHARMACY

Benjamin M. Kratz
Ethel M. LeGates
Frederick J. Lucchesi
Allen F. Peters
Gerald F. Rorer
Ernest D. Weiss
John E. Whitely
Paul C. Wieseman

BACHELOR OF SCIENCE IN PHARMACOGNOSY

Elsie M. Klenke

BACHELOR OF SCIENCE IN BACTERIOLOGY

Samuel Rothberg

PHARMACEUTICAL CHEMIST

Robert E. Connell
Christopher J. Delaney
George J. Gray
Edgar L. Kline
John P. Konicki
Louis A. Reber
Nathan Silver
William K. Sutterlin

GRADUATES IN PHARMACY

Morris Abromson
John G. Adams
William E. Alfano
Joseph H. Aqua
Frank D. Armstrong
Isadore Bailkin
Solomon L. Balin
Samuel Bank
Geo. Bartholomew III
Elmer S. Basom
John H. Beckett, Jr.
Marvin B. Bellows
William H. Bergen
Edward Bernhardt
Daniel Boxman
Herbert G. Brandt, Jr.
Eli J. Brewer
Mitchell Brodkin
Samuel J. Burkholder
Raphael R. Cain
Yetta Calika
Anthony Campanella
Theodore Campbell, Jr.
Nicholas F. Capella
Charles Caplan
Philip J. Cardamone
Gerald F. Chambers
Theodore R. Claire
Jeanette Cobots
Lewis W. Cohen
Maurice M. Cohen
Samuel Cohen
Arthur M. Cola
A. W. Coleman, Jr.
Fred D. Costenbader
Ward H. Curley
Pasquale J. D'Adamo
William T. Danes
Joseph C. Davis
William T. Davis
Leonard J. De Cesare
Louis J. DiLoreto
Thomas L. Dooley
Kenneth E. Eberly
Raymond F. Ecock
Henry C. Elder, Jr.
Leonard L. Epstein
Morris Feinberg

George J. Feldman
Frank Fernbach
Paul W. Fitzgerald
Harry Fleisher
Harold S. Foreman
William O. Frailey III
Collins F. Gillespie
Albert B. Glossman
George B. Goldman
Nathan Goodman
Walter S. Goodyear
Albert Greenblat
Louis S. Greenfield
Gordon H. Griffith
Adolphus S. Hale
Lewis H. Headings
John H. Henkel
Marlin H. Henning
William J. Higgins
James Y. Hummel
Russell L. Jackson
Harry Karet
Joseph Kiesel, Jr.
David J. Kleinbart
Harvey B. Kuhns
William Lachman
Charles B. Landes
Aaron M. Lauter
Joseph Laytin
William R. LeBar
Alexander E. Levin
Howard H. Lewis
James D. Loomis
Robert W. Lupton
Grace G. Mahoney
Gerson Malinsky
Robert W. Mann
William C. Manning
Anthony J. Marlino
Vincent J. McAndrew
James J. McElroy
Laird B. McLean
Gerald J. McNaughton
William H. McQueen
Alfred L. Merz
Russel B. Meyer
Samuel Meyers
Nathan Michlovitz
Edward I. Miller
Harry H. Miller
Joseph Mobilio
Sigmund Moerman
John E. Morton
Anthony A. Musiano
David H. Nerenberg
VanKirk S. Noyes
Wilbert L. O'Connell
Joseph J. O'Donnell
Mary K. O'Leary
Leonard O. Olson
Anthony S. Ordille
George N. Ott
Reginald W. Owens
David Peskovitz
John J. Piepon
Samuel C. Prusky
Samuel Reses
Carl F. Riley
John F. Rodgers
Herman M. Rosenfeld
Rose Rosenthal
Simon M. Rosenthal
Bella Rubin
David Sandman
Isadore H. Schiff
Seth E. Seewald
Louis B. Seiden
Joseph Seltzer
George B. Serlick
Nathan Shapiro
Sarah B. Shapiro
Roy E. Shenk
Max W. Sherman
Eugene S. Silberstein
Leopold Sitkin
Franklin V. Sloan
Nathan Spivack
Abraham Staller
Louis S. Staple
Joseph Stern
Peter P. Stukowski
Leopold S. Suwalski
Chas. M. Swantkowski
Floyd M. Swantkowski
Virginia R. Swiderski
William P. Teare
Edward W. Tighe
Marie A. Tomasello
Anthony J. Toscano
Otto P. Trostell
George A. Tushim
Milagros C. Veléz
Donald D. Voorhees
Henry W. Wainwright
Edward N. Watts
George L. B. Webb
George L. Weldon
Arthur B. Wenrich
Robert A. Wilson
Paul J. Woodrow
Walter A. Wright
Frank J. Yelencsics
David M. Zemlin

CANDIDATES WHO HAVE COMPLETED SPECIAL COURSES AND HAVE QUALIFIED FOR CERTIFICATES

(This does not include students who completed courses in these subjects for credits for a degree.)

IN BACTERIOLOGY

Kermit R. Fritzinger — Leo L. Goldman
Robert W. Rohm

IN CLINICAL CHEMISTRY

Leon Cooperman — Ethel H. Szo

IN PHYSIOLOGICAL ASSAYING

Russell F. Brodman

Award of Prizes 1931

GRADUATES IN PHARMACY (Ph. G.)

DESIGNATED AS "DISTINGUISHED"

With General Average of not less than 95%

FRANK FERNBACH.

DESIGNATED AS "MERITORIOUS"

With General Average between 90% and 95%

Solomon L. Balin — Joseph Laytin
Louis S. Greenfield — David H. Nerenberg
Harry Karet — Joseph Stern
William P. Teare

The Proctor Prize, a gold medal for the highest average of the class, is awarded to:

FRANK FERNBACH.

The William P. Webb Memorial Prize, twenty dollars and a bronze medal for the highest general average in the branches of Operative Pharmacy, Analytical Chemistry and Pharmacognosy, is awarded to:

FRANK FERNBACH.

With Honorable Mention to:

Solomon L. Balin — Russell L. Jackson
William H. Bergen — Harry Karet
Pasquale J. D'Adamo — Joseph Laytin
Eugene S. Silberstein

The Frank Gibbs Ryan Prize, a gold medal endowed by the Class of 1884, as a memorial to their distinguished classmate, for the best average in the Chemical and Pharmaceutical Laboratory Courses, is awarded to:

FRANK FERNBACH.

With Honorable Mention to:

William H. Bergen
Harry Karet
Wilbert L. O'Connell
Joseph Stern
William P. Teare
Arthur B. Wenrich

The Maisch Botany Prize, a special prize of twenty dollars in gold, offered by Sinclair S. Jacobs of the Class of 1909 to the member of the graduating class who shall have presented the best herbarium collection of plants, or the best thesis on the microscopical structure of medicinal plants, is awarded to:

SAMUEL C. PRUSKY.

With Honorable Mention to:

Paul C. Wieseman
Leopold Sitkin

The Remington Memorial Prize, twenty dollars, offered by the estate of Joseph P. Remington, for the highest average in the examinations of Operative Pharmacy and Dispensing, is awarded to:

ALFRED L. MERZ.

With Honorable Mention to:

William H. Bergen
Philip J. Cardamone
Frank Fernbach
James Y. Hummel
Russel B. Meyer
Eugene S. Silberstein

The Mahlon N. Kline Theoretical Pharmacy Prize, a Troemner Agate Prescription Balance, offered by the Mahlon N. Kline Estate, for the highest average in Theory and Practice of Pharmacy, is awarded to:

FRANK FERNBACH.

With Honorable Mention to:

Louis S. Greenfield
Joseph Stern

The Frederick William Haussmann Memorial Prize of one hundred dollars, given to the Pharmacy student with the highest average for the last three years of the course, is awarded to:

FRANK FERNBACH.

With Honorable Mention to:

Harry Karet
Joseph Laytin
David H. Nerenberg
Wilbert L. O'Connell
Joseph Stern
William P. Teare
Arthur B. Wenrich

The Lambda Kappa Sigma Scholarship Award offered to the member of the Lambda Kappa Sigma Sorority in the graduating Ph. G. class, attaining the highest average during her senior year, is awarded to:

VIRGINIA R. SWIDERSKI.

With Honorable Mention to:

Jeanette Cobots
Marie A. Tomasello

Gold medals awarded by the Alumni Association to the student of the Ph. G. class and to the student of the B. Sc. class who attain the highest scholastic averages, are awarded to:

GRADUATE IN PHARMACY (Ph. G.)

FRANK FERNBACH.

BACHELOR OF SCIENCE (B. Sc.)

ALBERT F. DEUBLE.

NEWS ITEMS AND PERSONAL NOTES

Senior Class Visits Sharp and Dohme

A special feature of the Commencement Week activities this year was the visit of the senior class June 8 to the Sharpe and Dohme biological and pharmaceutical laboratories in Philadelphia.

The students were taken first in buses to the company's extensive and famous biological laboratories at Glenolden, a Philadelphia suburb. The entire morning was spent there.

The seniors then were the guests of Sharpe and Dohme at luncheon, following which they inspected the pharmaceutical laboratories at Broad and Wallace Streets, Philadelphia.

Active in the arrangements for this special trip and as hosts during it were A. Homer Smith, 1902, who is president of Sharpe and Dohme, and Paul S. Pittenger, 1909 Medico-Chi, and Leith S. Temperton, 1911, vice-presidents of the company.

Dr. Krusen Speaks at Columbia

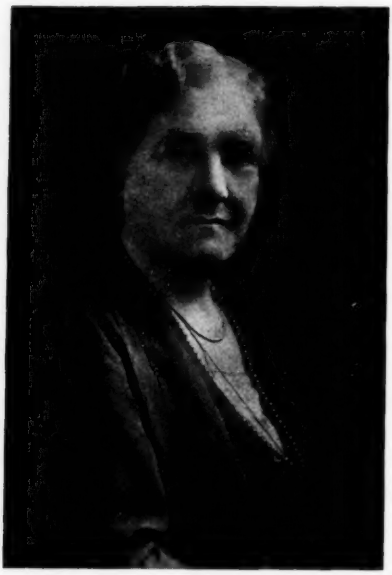
At the 1931 Commencement exercises of Columbia University College of Pharmacy held in Carnegie Hall, New York City, May 28, Dr. Wilmer Krusen, president of P. C. P. & S., delivered the Commencement address to the graduating class. Dr. Henry V. Arny, 1889 graduate of P. C. P. & S., is dean of Columbia's college of pharmacy.

On June 3 Dr. Krusen delivered the Commencement address to the graduates of the nurses' training school of the Reading (Pennsylvania) Hospital. At Phoenixville, Pennsylvania, on June 5, he spoke in the high school auditorium at the commencement of the nurses graduating from the Phoenixville Hospital nurses' training school.

As part of its Philadelphia convention activities, the American Medical Association sponsored a radio address by Dr. Krusen, broadcast by WIP, June 9, entitled, "Keeping a City Well." Dr. Krusen was formerly director of public health of the City of Philadelphia.

The Women's Club of the Philadelphia College of Pharmacy and Science

One of the most active and unique organizations connected with the Philadelphia College of Pharmacy and Science is the Women's Club of the institution. It was formed through the initiative of Mrs. Wilmer Krusen, two years ago and has developed into one of the busiest and most enterprising of the Women's Clubs in Philadelphia.



Mrs. Wilmer Krusen

Its aim as stated in the constitution of the Club is to promote, by co-operative effort, the interests of the College through sociability, service and culture. That it has succeeded in every aspect of its plan and purpose is amply proven in the fine things which the Club has done for the student body of the College, and for its own members.

With a membership now running close to two hundred, it has steadily grown, and with incorporation in the Pennsylvania Federation of Women's Clubs it has in every sense justified the hopes which led President Krusen to work so diligently in its formation.

So that an idea may be had of the cultural work of the group, the Club's calendar for a recent month is appended:

Club Calendar

TUESDAY, MAY 11:
2.30 P. M. .....Gardens of America and the Continent
Anna Linn Bright
Auditorium of Society for Ethical Culture,
1906 S. Rittenhouse Square

FRIDAY, MAY 15:
8.15 P. M. .....Musicale and Dance
Welsh Singers in Costume
Other Delightful Numbers Being Arranged
Social Evening for Friends of the College and Members of the Club. Mrs. Howard Smith and Mrs. Ivor Griffith in Charge

WEDNESDAY, MAY 20:
11.00 A. M. .....Executive Committee Meeting
Hotel Walton

WEDNESDAY, MAY 27:
11.00 A. M. .....Stated Meeting, Business Session
12.00 M. .....Reception for Newly Elected Officers and New Members
12.30 P. M. .....Birthday Luncheon
Address .....Living in Present-Day Italy
Mrs. George D. Hadzsits
Music in Charge of Music Committee

At the last meeting of the Women's Club, Mrs. Krusen was unanimously elected president for the coming year.

Dedication of Murals in College Foyer

The paintings shown above are the first and last of a series of six paintings showing the progress of pharmacy through the ages. They were painted by William F. Matthews, internationally renowned artist, of Brooklyn, New York.

The first of the series, representing the beginning of pharmacy (shown at the left above), was presented to the College by Mrs. Charles H. LaWall and Miss G. H. Renshaw in memory of their father, Thomas Worthington Wainwright Renshaw, a retail pharmacist, who died in 1904.

The last one of the series, representing modern pharmacy (shown at the right above) was presented by Dean Charles H. LaWall in memory of his father, John Jacob LaWall, a retail pharmacist, who died in 1896.

The presentation took place at the College, Monday of Commencement Week. Colonel Samuel P. Wetherill, Jr., College trustee and president of the Philadelphia Art Alliance, made the presentation. The murals were accepted on behalf of the College by President Wilmer Krusen.

At the ceremonies President John G. Adams, of the 1931 class, announced that his class is presenting to the College a third painting in this series of murals.

BOOK REVIEWS

40 YEARS OF ACTIVITY OF THE GERMAN PHARMACEUTICAL SOCIETY. By Dr. P. Siedler. 90 pages, 5 plates. Bd. 6 marks. Verlag Chemie. Berlin, 1930.

The review, dedicated to Dr. H. Thoms, the founder and leader, nestor of German pharmacy, aims to be a contribution to the cultural history of pharmacy. It also includes a record of the twenty-fifth anniversary of the Pharmaceutical Institute of the University of Berlin.

Among many interesting reports, mainly of a personal nature, we find an interesting address by the renowned chemist Professor Willstaetter on anthocyans, given before the society at its twenty-fifth anniversary, 1910.

From the start it had been the society's aim to foster with pharmacy also all phases of natural science contributing to the progress of scientific pharmacy. Thus addresses were generally given by foremost representatives at the monthly meetings and published in the "Berichte" of the society.

In 1924 this publication was combined with the scientific journal *Archiv der Pharmazie* of the German Apothecary Society. A wide scientific scope was thus assured. We learn of twenty-two branches of the Pharmaceutical Society active now throughout Germany.

In the review of twenty-five years' activity of the Pharmaceutical Institute we learn much of its strife for higher learning and for high scientific achievement of the workers connected with it. Throughout the forty years we follow the growth and realize the exemplatory accomplishment—even in the recent hard times—of the German Pharmaceutical Society. Photographs of the foremost leaders are included. Dr. Siedler is to be complimented for this inspiring record.

ARNO VIEHOEVER.

HANDBOOK OF PHARMACOGNOSY. Second enlarged edition by A. Tshcirch in co-operation with fifteen authors. B. Tauchnitz, Leipzig, 1930. 1st vol. 583 pages, 376 text figures, 42 plates, 3 charts. General Pharmacognosy.

Several months ago we have in this JOURNAL given a brief review of the first two issues. With the publication of the fifth issue the first volume is now complete.

It includes a discussion of the aims, objects of pharmacognosy, the cultivation, collection and handling through shipping of crude drugs. It enumerates the bibliography of hand and textbooks and of numerous publications, as current magazines, reports from trade, institutions and professional organizations, and deals finally with the teaching of pharmacognosy, the storing and the examination of crude drugs. In connection with teaching of pharmacognosy the following courses are very briefly outlined; one for a microscopic pharmacognostic laboratory course, teaching

(a) General applied anatomy: cell contents, membranes and cell tissues.

(b) Morphological anatomy (spec. and compar. pharmacog.): cryptogamic and phanerogamic drugs—as roots, stems, leaves, flowers, fruits, seeds, galls.

(c) Applied pharmaco anatomy: analysis of drug powders and microchemistry.

(d) Industrial microscopy: microscopy of foods, stimulants, spices, feeds and technical products.

2. Another for a pharmaco chemical laboratory course, teaching

(a) Preparative operations: isolations of glucosides, alkaloids and other plant constituents.

(b) Assay methods.

The treatment with its many references to either literature or personal study of experience is so comprehensive, the data are so informative or suggestive, the illustrations so helpful, that it is indeed a joy to have such an up-to-date book available for study or reference.

ARNO VIEHOEVER.

ESSENTIAL OILS. III edition, third volume. By E. Gildemeister. Schimmel & Co., Miltitz-Leipzig, 1931. 1072 pages, 6 charts, 68 (9 colored) illustrations.

Thirteen hundred and seventy-one essential oils (446 more than in the second edition), are discussed in this new edition. The data reported are based on literature as late as 1929. The monographs are treated in order of the botanical relationship, which, as is well known to plant chemists, is often strikingly supported by chemical relationship.

The volume starts with the oils of citrus species, giving first a general discussion, then production and trade, with a detailed geographic chart of places where factories are located. Sixty-four pages are given over to the discussion of lemon oil, stating sources, production, properties, storage, composition and finally testing methods.

The thoroughness of treatment is exemplified throughout the book; thus we find eight-one pages of discussion of peppermint oil, and thirty-five chapters dealing with different essential artemisia oils. A list of flash points, very useful in identification of volatile plant constituents, completes the volume.

Gildemeister's book is an indispensable reference work to the plant chemist and professional pharmacist. The illustrations, in part photographs, are excellent in their clear, descriptive and suggestive presentation of the objects chosen; the colored pictures are reproductions from paintings donated by Schimmel & Co. to the German Museum in Munich, depicting scenes of cultivating, collecting or extracting plants containing volatile oils—and represent exquisite gems, fitly adorning the pages of this comprehensive work on essential oils.

A special general index volume for all three volumes, comprising 124 pages, is also now available.

ARNO VIEHOEVER.